THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIII. No. 1342.] LONDON, JANUARY 29, 1889. [41ST YEAR. Price 6d.

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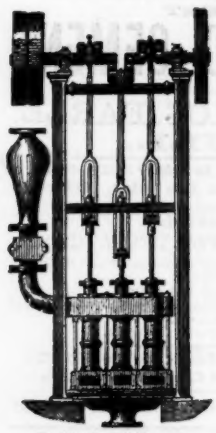

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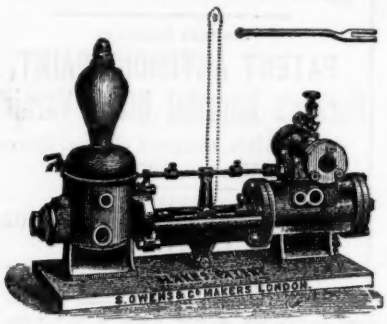

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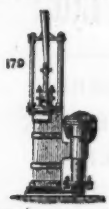

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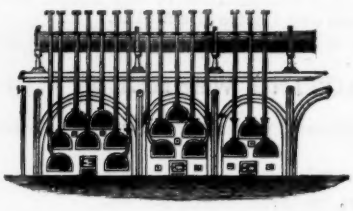

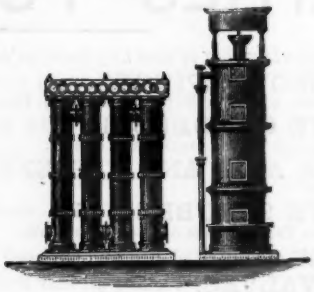

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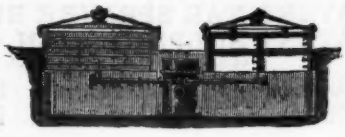

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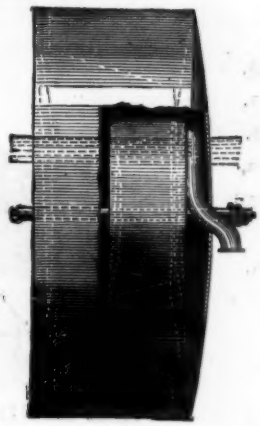

Meters fitted with this Patent Drum discharge the same volume of gas at each revolution, irrespective of the water-line, and are consequently noted for correct registration; they are uniform in appearance externally with our ordinary Meters, and are made in both Tin and Cast-Iron Cases.

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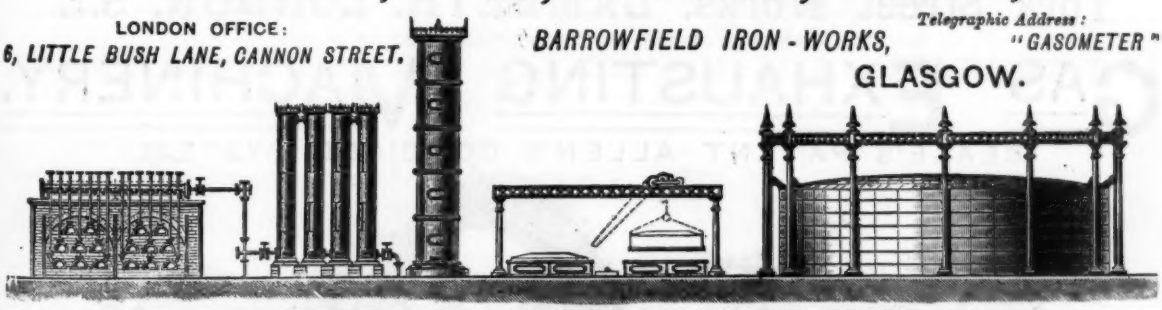

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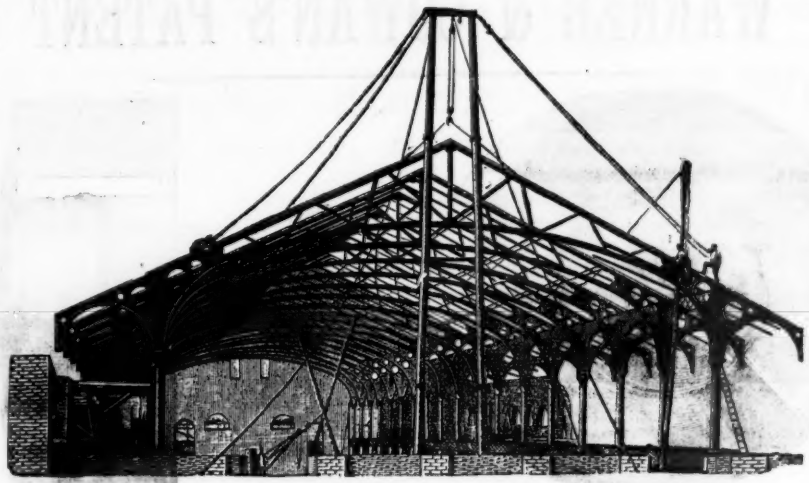

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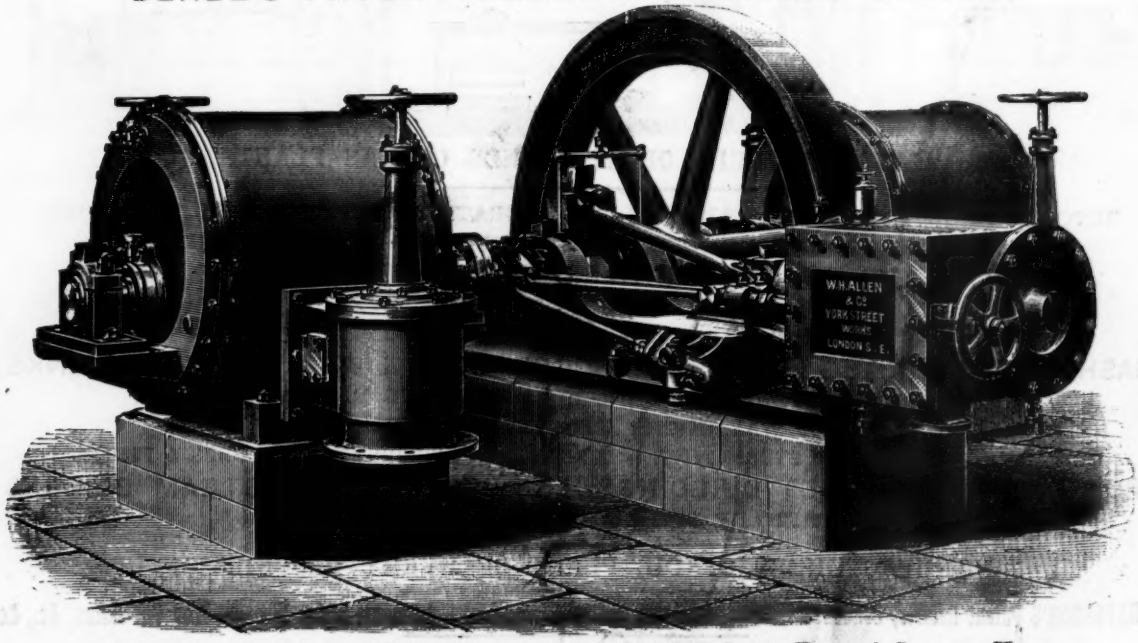

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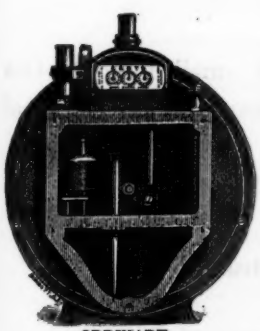
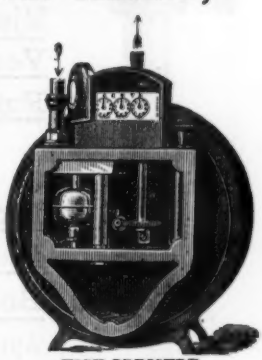


ORDINARY.



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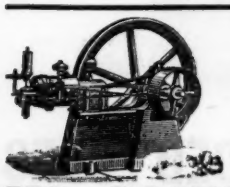

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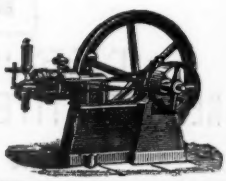
NO SLIDES. IGNITION EVERY REVOLUTION.

20 PER CENT. CHEAPER THAN ANY OTHER

Prices and Particulars from the Sole Makers—



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Apparatus for Acid and Corrosive Vapours and Liquids.

Most of the Appliances named may be seen in operation at the above address, by appointment.

IMPROVED STREET LIGHTING

AND

THE AVERAGE METER SYSTEM FOR STREET LAMPS.

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Correct Registration, with Variable Water Line.

Long Float Range, preventing Valve being Closed by Vibration from Traffic.

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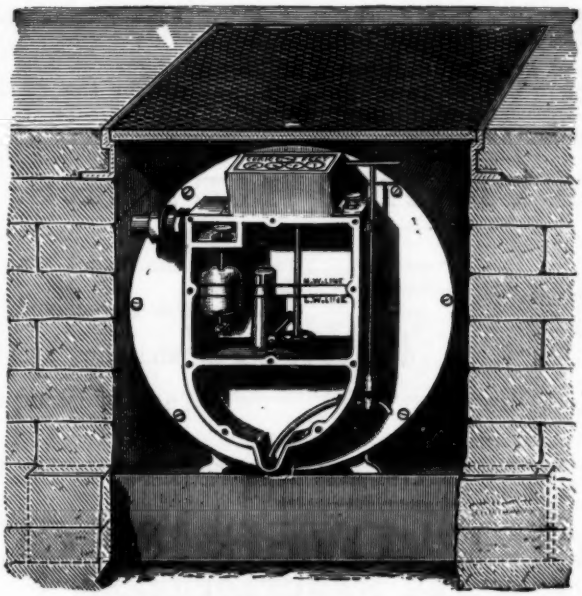
To prevent Freezing, a little Glycerine should be mixed with Water when severe frost sets in.

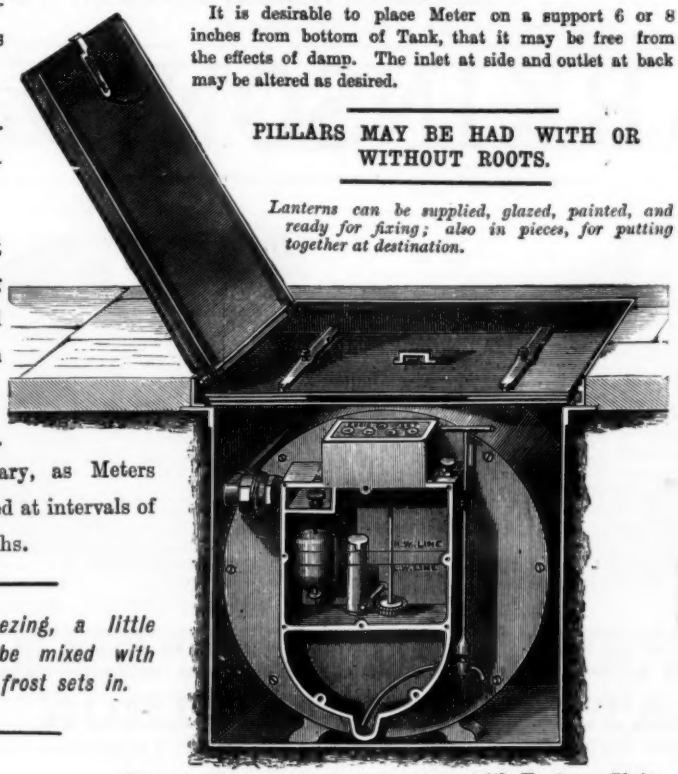


Meter in Brick Tank, with Footway Plate.

It is desirable to place Meter on a support 6 or 8 inches from bottom of Tank, that it may be free from the effects of damp. The inlet at side and outlet at back may be altered as desired.

PILLARS MAY BE HAD WITH OR WITHOUT ROOTS.

Lanterns can be supplied, glazed, painted, and ready for fixing; also in pieces, for putting together at destination.



Meter in Water-tight Cast-Iron Box, with Footway Plate.

WARNER-COWAN METER IN STREET-LAMP PILLAR.

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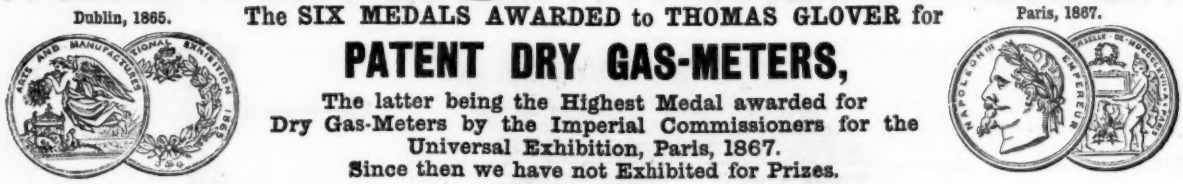


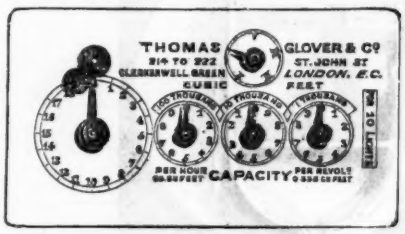
The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

PREPAYMENT METERS.

By setting the Hand of the large Circle on the left-hand side of the Dial, Gas Companies can allow a Consumer to receive only



the exact amount of Gas they have received prepayment for, and thus avoid the unpleasantness of asking users for a deposit.

ALSO MAKERS OF BROWNHILL'S PREPAYMENT ATTACHMENTS.

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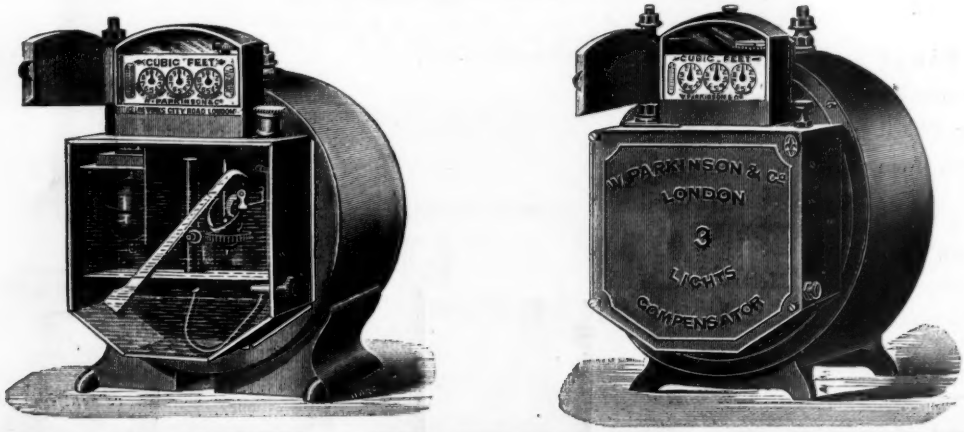

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IN TINPLATE OR CAST-IRON CASES

COMBINE THE FOLLOWING IMPORTANT IMPROVEMENTS:—

Parkinson's Patent Three-Partition Measuring Drum { *Ensures perfect accuracy of measurement with the least possible friction, works with the greatest ease, and is free from complication of any kind.*

Slow-Spoon Compensator { *Maintains an unvarying Water-line without any appreciable friction, and provides a large reserve of Water. Has stood the test of time.*

Enclosed Float { *Allows sudden or excessive pressure on the Inlet without affecting the working of the Meter, or extinguishing the Lights.*

COTTAGE LANE WORKS, CITY ROAD, LONDON. *Telegraphic Address:* "INDEX LONDON."

[See also Advt., p. 224.

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NOTICE TO SUBSCRIBERS
AS TO PAYMENT OF SUBSCRIPTIONS IN ADVANCE.

Subscribers who desire to avail themselves of the reduction in the Subscription to the JOURNAL (21s.) by paying in advance for the Year 1889, are reminded that this can only be done during the present month.

Telegraphic Address: "GASKING LONDON."

TO ADVERTISERS.

ADVERTISEMENTS for the next number of the JOURNAL must be received by Monday, 12 o'clock noon, to ensure insertion; but as the Advertisement sheet of the JOURNAL is sent to Press the first thing on Monday Morning, Advertisers will please bear in mind that Orders for Alterations in or Stoppages of PERMANENT Advertisements should be received Not Later than Two o'clock on SATURDAYS.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 29, 1889.

AN ASPECT OF CORPORATION GAS MANAGEMENT.

THE columns of the JOURNAL have of late contained a great deal about one particular subject—that is to say, the arrangements of Local Authorities having the control of gas undertakings for obtaining their supplies of the raw material, coal. We do not propose on the present occasion to discuss any of the particular circumstances that have come under public notice in connection with the coal supplies of the gas undertakings at Salford, Halifax, or Leeds. These "incidents," as the French would call them, may or may not be closed. We shall not have anything to say about them, or the people whose names have recently been bandied to-and-fro in connection with them. What we do propose is to pass the whole matter under review in a general and impersonal way; treating it simply as illustrating the conditions of a special branch of the gas coal trade in a particular district. This method of dealing with the subject may prove more instructive and quite as interesting as if it were regarded simply from the personal standpoint. Many people who should know better delight in personalities, and pretend to have got to the bottom of a question when they can represent it as a case of A. against B. This is commonly a mistake, for circumstances control persons as frequently as the latter appear to direct events in their own interest; and the failing of the simply personal treatment of a matter of business or a social or administrative incident, apart from its essential vulgarity, is that it distracts attention from principles to concentrate it too exclusively upon agents. When surveying, as one cannot help doing, however unpleasant the subject, the recent gas troubles in the towns already named, it is therefore open to us to discard for a moment the view which represents them (and with considerable truth) as arising out of trade rivalry, and to look at them in a way that has not hitherto been discussed. The first generality that strikes an observer of these things is that the trouble about mismanagement of the coal supply is confined to Corporation gas undertakings. The fact that it has developed only in a limited geographical area is also significant, although it is almost a necessary corollary of the main statements. So far as the so-called scandals have extended, they may be truly described as a complaint affecting Corporations only; Gas Companies in the same districts escaping the contagion. The question that naturally arises when some organisms appear to be peculiarly liable to a disease which passes over others equally exposed to it, is whether the affected subjects have any weakness of constitution which renders them more open to attack by the specific poison. We are fully aware that if we say that gas administration by Local Authorities has such a weakness, it may be replied that we have never seen any good in the transfer of gas undertakings to such bodies, and are therefore not unprejudiced judges. On the other hand, we do not shrink from referring to our well-understood position regarding this point of policy, and have a right to claim that every fresh discovery of a weakness in Corporation gas management is an additional justification for that attitude. The question, therefore, now is, Do these incidents disclose any such weakness in Corporation gas administration? We unhesitatingly say that they do; and moreover that the failing is deep-seated and serious.

What are the facts? A gas undertaking is a large consumer of coal, which its managers must procure. In the case of a Company, we have management by a Board of Directors, every one of whom is pecuniarily interested in a perfectly honourable sense, as a man of business, in the prosperity of the concern entrusted to his care, in addition to the responsibility which he feels towards the proprietors whose money, together with his own, is at his command. With a Local Authority the case is altogether different. The members of the Gas Committee have only their responsibility to their constituents to guide them. In a community of perfectly public-spirited people, this obligation would, of course, be sufficient; but we fear that the world has not yet reached that perfection of public virtue. Even if the force of self-interest pulling in the same direction as responsibility could be dispensed with as of no account, there is another point in which a Gas Committee of a Corporation compares unfavourably with a Board of Directors—they have no such test of their successful administration as the reaction of selling price and dividend supply to the latter. The utmost that the average Committeeman cares for is to be able to make a good defence when his conduct or policy is assailed in the Council chamber or the local press. It is the same with him as it is with the Minister who represents in Parliament a department of the public service. All he cares for is to fence inconvenient questions; and if he can turn them back upon the questioner by a neat exposure of some blunder on his part, the triumph is all the greater. This may be good party warfare; but it is not business. As a matter of fact, it is notorious that if a member of a Corporation Gas Committee is accused either of negligence or misdirected energy in the discharge of his duties, he treats the accusation as a political

impeachment, not as a complaint addressed to him as a man engaged in business. The consequence is easily described. One or two members of the Committee in political alliance with a number of others, see their way to a little plunder in connection with the coal contracts, either for themselves or their friends. There is no need to particularize as to how matters of this kind are managed. It is done more or less artfully; but as long as the manipulators are not too rapacious, who is to find them out? In the coal-producing districts of this country, where the gas-works contracts are large and lucrative, and mainly at the disposal of Committees, who is to say how interests ramify? On a Board of Directors, few in number and all thoroughly well-known men, one Director interested openly or indirectly in coal cannot hoodwink his colleagues as incurious town councillors may be hoodwinked by their fellows. The mischief is rendered easier for Committeemen to accomplish when, as is too often the case, they do not employ an engineer of character and position, and entrust him with the supervision of the coal contracts. In this case, there is nobody to look after them; and if some of them do not make the best of their opportunities in their own behalf, they are strangely belied.

Dealing with coal contracts is the most delicate of all duties which a Gas Committeeman can undertake; yet they do it with a rashness which argues little thought for their own reputations. One consequence of this is a feverish distrust on the part of the public, which shows itself in many ways, and more often than not is altogether misdirected. The ratepayers look for some infallible test of the integrity of their trustees in the administration of their property; but in vain. However cheap gas may be, this is no security against the most tremendous suspicions of peculation at headquarters. The volume of business done by a large gas undertaking is felt to be sufficient to provide scope for heavy plunderings. The people scarcely know whom to trust to administer such big concerns without the stimulus which self-interest supplies in their own private businesses. If a Concillor is rich, he may be careless; if poor, he may be needy. If dull, he may be tricked to his face; if sharp, he may be too clever. Of course, we do not say that this is the state of affairs everywhere. There are many local administrators of public business who are, for shrewdness and integrity, a credit to their race and breeding. In some places there could not be any possible "disclosures" to the shame of the Gas Committee, and the people rest satisfied in this knowledge. If asked for an indication of these localities, we should say that the only one we know of is that they lie wherever there is to be found a Gas Engineer and Manager of honour and ability, recognized as such at home as well as abroad.

This brings us to the result of our examination of these painful incidents, and to the suggestion of the only way by which they can be prevented. Broadly speaking, one great cause of the weakness of Corporation gas management is the diffusion of responsibility among too many individuals. The smaller an executive, so long as it is numerous enough for its work, the better the work will be done. All things being equal, there is much more opportunity for mismanagement and maladministration in a Committee of fifty than in one of twenty-five members, and more in twenty-five than in a bakers' dozen. What may be regarded as the besetting sin of the average Committeeman is the love of feeling his power, whether in connection with a contract or a question of officers and salaries; and many such an one not actually corrupt is worked upon through this foible to do some queer things. On all accounts, the fewer of them the better, if only those men are appointed who are really good for anything. Finally, the best safeguard for a Committee and for the public is a good Manager, well-paid, and loaded with a clear responsibility. Where the Committee meddle and muddle, there will be corruption sooner or later; and the corruption will be difficult to detect and bring home to the right men among the many who have had "a finger in the pie." Where there is a respectable and respected Manager, there need be no uncertainty as to who is responsible for anything going wrong. It is, of course, not impossible for the Manager, being human, to abuse his trust; and we are not arguing in favour of him being allowed to dispense with such safeguards as every honest man would demand for his own protection. Even at the worst, however, it may be doubted whether the most audacious of men in a high official position has ever been so costly as a loose, inefficient Committee, including, as it is pretty sure to do, more than one corrupt member. A fool is almost as bad as a rogue; and when roguery and foolishness go together, it is bad indeed for those who have to pay. These are only a few of the reflections which recent "gas scandals" suggest to anyone who will look beneath the surface.

REDUCTION OF PRICE BY THE SOUTH METROPOLITAN GAS COMPANY—THE ABOLITION OF THE COAL DUES AND THE COUNTY COUNCIL.

The expected abolition of the London Coal and Wine Dues next July is rendered easier by the action of the Directors of the South Metropolitan Gas Company, who on Wednesday last decided to reduce the price of gas in their district of supply by twopence per thousand cubic feet, thus bringing it down from 2s. 5d. to 2s. 3d. per 1000 cubic feet as from the beginning of the current quarter. It is understood that the Company had a very good half year up to Christmas; the increase of gas consumption being satisfactory, and tar and coke paying better than they have done for a long time past. It was a promise on the part of the Company that if the Coal Dues were allowed to lapse, the price of gas would be lowered by a penny per thousand cubic feet; and further that the Directors would not recommend the distribution of any increased dividend on this account, as they might do under the sliding scale, for the reason that the removal of the coal tax was not contemplated when the Company's initial price was fixed by Parliament. It has nevertheless been a favourite argument of those who desire the continuance of the dues that their abolition would only add more to the profits of the "monopolist" suppliers of gas, and would consequently tend to enhance the cost of acquiring their property on behalf of the ratepayers—a consummation which in the same quarters is commonly referred to as only a question of time. This declaration from the Directors of the South Metropolitan Company will do more than any amount of speech-making and letter-writing in the newspapers to convince the public that the abolition of the Coal Dues will be a real benefit to them, and will go far to silence the assertions of those who have tried to make bogeys of the Gas Companies in connection with this matter. The County Council for London contains a number of members hostile to the coal dues upon general grounds; and there is now little prospect that the soundness of their political views upon this question will be injured by experience of the convenience of having a supply of spending money independent of the ratepayers. With regard to the County Council for London, some uneasiness has been caused by the consideration that a very large proportion of the new body are men of pronounced Radical, not to say Socialistic professions, whose views respecting the duties and powers of a local authority may possibly be of a revolutionary cast. This party is already accused in some quarters of having lulled the careless ratepayers to sleep by professing before the election to sink politics, only to claim afterwards the right to use as politicians the position accorded to them as local government reformers. They are further suspected of a desire to play havoc with all sorts of established institutions during their term of office, and, especially if they are willing to relinquish the coal dues, it is thought that they may desire to get possession of the London Gas and Water Companies for the purpose of applying their revenues to the diminution of those rates which their energy in other directions might otherwise inconveniently swell. We regard all this as vague fancy for the present, while at the same time treating it seriously enough as a hint of the direction from which future disturbance may come. The first London County Council have only about 2½ years of business life to reckon upon, during which they will, or ought to have, enough to do without meddling with the gas supply, or any such matter. There is no doubt the first Council is wholly an experimental one, intended to try in a safe manner the scope of the Act. If the members go beyond their warrant, the next election will see the last of them.

A METROPOLITAN RATING CASE.

In the present issue of the JOURNAL will be found the conclusion of the rating case of the Greenwich Vestry against the South Metropolitan Gas Company. The nature of the dispute between the Company and the Vestry is easily appreciable, although the proceedings before the Magistrate at the Greenwich Police Court extended to a great length. The parish authorities rated the Company's East Greenwich Station in a certain sum, placing the valuation in a provisional list, after the usual way with additions to rateable properties, preparatory to their inclusion in a supplementary list, which would hold good until the next quinquennial valuation, in 1890. The Company refused to pay the rate (which.

as a matter of fact, they regard as excessive), on the legal ground that it was invalid and entered in an illegal list; this being the only point open for them to take in the first instance. At the first hearing on the 5th inst., the parish was only represented by the rate collector; Mr. W. C. Ryde appearing for the Company. The matter was opened then; but after a great deal of talk between Mr. Ryde and the Magistrate, an adjournment was ordered, to permit of the parish being properly represented. The hearing was resumed on the 15th inst., when Mr. A. Glen appeared for the Vestry, and the point was argued in a triangular fashion between the two parties and the Magistrate, who seemed to be very anxious for information as to what he had better do in the matter. His Worship was told from the first that the case would not rest with him; that the summons was but a stage in proceedings that could only be brought to a conclusion elsewhere. If the Company had been entitled to go into the merits of the case, they would have alleged that the valuation was wrong, certain premises being valued twice over; but this they could not do. In the event, the Magistrate decided against them—a circumstance which does not make the slightest difference to the ulterior proceedings. Unless the Company would consent to lie down to be ridden over rough-shod by every parish surveyor, however, it was incumbent upon them to protect themselves by paying nothing save under compulsion at every point.

TITLE AND INDEX TO VOL. LII.—In accordance with the arrangement commenced with the volume of the JOURNAL for the first half of last year, the title-page and index to Vol. LII. (July to December) will not be issued as part of the JOURNAL. It will, however, be ready in the course of the present week; and a copy will be forwarded post free by the Publisher on receipt of a post-card from any subscriber.

REDUCTION IN THE PRICE OF GAS BY THE SOUTH METROPOLITAN GAS COMPANY.—The following notice was issued yesterday by the South Metropolitan Gas Company to the consumers in their district:—"In anticipation of the abolition of the coal dues in July next, the price of gas, which otherwise would have been lowered 1d., has been reduced 2d. per 1000 feet from the Christmas quarter. The price is now, therefore, 2s. 3d. per 1000 feet."

DEATH OF M. VAUTIER.—We regret to learn, from the last number of *Le Gaz*, of the death, on the 9th inst., at Lyons, in his 71st year, of M. Emile Vautier, who was at the head of one of the most important groups of gas undertakings in the Lyons district. With the assistance of his colleague, M. de Loriol, he also superintended the operations of a large number of gas-works in France and Italy, and of one in Spain. The deceased gentleman was a member of the Société Technique.

DEATH OF MR. RICHARD BRADSHAW.—We have to record with much regret the death of Mr. Richard Bradshaw, the Chairman of the Commercial Gas Company. He joined the Board of the Company nearly 25 years ago; and was elected Deputy-Chairman in 1873, and Chairman in 1875. His ability and courteous demeanour gained for him the regard and esteem of his colleagues, by whom—as well as by the proprietors, who will recall his genial presidency at their general meetings—he will be greatly missed. Mr. Bradshaw, who was only 57 years of age, died on the 22nd inst., at Brighton (whither he had gone for the benefit of his health, which began to fail a few months ago), and was buried at Kensal Green on Saturday last.

LONDON FOGS.—Last Wednesday week, at the annual meeting of the Royal Meteorological Society, the President (Dr. Marcet) delivered an address on "Fogs." Of the London fog, he gave Dr. Tyndall's explanation, that each particle of condensed vapour is covered by coal smoke. London fogs, he added, are usually accompanied by a high barometer, and are frequently dry in their character. As to the main cause of London fogs, he stated it was a well-known fact in meteorology that cold air on the tops of hills, being heavier than the air below, slid down the slopes, so that the lower parts of hill sides were actually colder than the plains at some distance from the hills. Now, London was surrounded by hills; and the air was colder on those hills than in London, with its millions of inhabitants, its coal fires, and factories. Hence it was heavier, and would have a great tendency to slide down the hills towards the town and the river. Should the air in town be on the point of saturation, and the cold air from above saturated with vapour, it was obvious that the increased cold from above would produce a precipitation of moisture, and a fog was produced. If the hill tops were not only colder than the air below, but enveloped in a fog, it stood to reason that the fog below would be all the denser, and especially in the neighbourhood of water, such as the River Thames and the ornamental waters in the Parks. There was this difference between a London fog and a fog or a cloud on a mountain summit—that in the case of the town fog, carbonic acid gas was abundantly formed in the fog itself, mainly from coal fires; while fogs or clouds on mountain tops were away from the source of the gas, and it had to come up from below and get into them. The outer layers of a cloud would absorb the carbonic acid of the air surrounding it, and leave but a relatively small amount to reach an observer inside the cloud.

Water and Sanitary Affairs.

THE complicated nature of the law which sometimes affects the question of damages from subsidence caused by mining operations, appears in the case of the *Consett Water Company v. Ritson*, argued before Justices Cave and A. L. Smith in May last year, and in reference to which judgment was given in the Queen's Bench Division last week. It will be seen by our report that the matter came before the Court in the shape of a special case, agreed upon between the parties, with a view to have the question of law fairly determined. In this respect the suitors are visited with disappointment; the two Judges being at variance with each other as to the state of the law. But the judgment of Mr. Justice Smith, given against the Company, being withdrawn, the defendant has the opportunity of taking the case to the Court of Appeal. The considerations advanced are highly technical in their character; but the practical issue is a very broad one. The defendant has so worked the coal in his mines within 40 yards of the Company's reservoir, that the latter has become absolutely useless owing to the subsidence of the ground in which it was formed; the embankment and floor of the reservoir being cracked, so that no water can be retained. Such destruction seems to involve not only a private loss, but actual prejudice to the public. So far as the interests of the latter are concerned, it might be argued that the water was worth more than the coal. But this view of the catastrophe makes no appearance in the remarks of the learned Judges; the water consumers being left to their fate. The Company asked for £15,000 damages, and for an injunction to restrain the defendant from continuing his objectionable operations. The Company pleaded that they were owners of the land, and claimed that they were entitled to have the surface supported by the minerals underneath and adjacent. Certainly the land would otherwise be worth nothing to them. It appears that the Company purchased the site of their reservoir compulsorily from one John Clavering, and the defendant claims title, under the Bishop of Durham, Lord of the Manor, to work the mines and minerals beneath the property. Before proceeding to work the mines, he gave due notice to the Company; but the latter made no attempt to treat with him—evidently relying upon their supposed right to be protected against damage from beneath. Mr. Justice Smith compares the case of the Consett Water Company to that of a Railway Company, and admits of no distinction between the two. It is "settled "law" that where a Railway Company compulsorily purchases from an owner, who, at the date of notice to treat, is owner both of the surface and the minerals underneath it, and the Company gives no notice to treat for the minerals, it purchases solely the surface, and "obtains no right of support "at all." Clavering, it is admitted by Mr. Justice Smith, had a right of support from the Bishop of Durham; but the Company have no such right. On the other hand, Mr. Justice Cave considers that as before the conveyance to the Water Company the mineral owner could only have worked the mine on the terms of leaving sufficient minerals to support the surface, so the owner could have no greater right afterwards. The Company would, in fact, when they bought the surface, also buy the right of support, though they might have to give compensation for the minerals left. In some shape or other, one more case will be added to the others which are supposed to illustrate the law relative to this difficult subject.

The judgment given in the special case brought before two Judges in the Queen's Bench Division of the High Court of Justice, bearing on a dispute between the Bristol Water-Works Company and the Bristol Corporation, seems to rest on a very narrow basis. The Corporation had made some changes in the levels of the quays at Bristol, necessitating certain alterations by the Company in the position of their pipes. By one section of the Company's Act, it is provided that if the Corporation alter the level of the streets at any time, so as to involve an alteration in the position of the pipes, they are to pay the Company the cost of such alteration. But in the present instance, the Corporation disputed their liability, on the ground that the quays are not streets within the meaning of the statute. By the interpretation clause of the Water-Works Clauses Act of 1847, the word "street" is made to include any "public passage or place" within the limits of the Company's Act. It also includes any "road" within such limits. The Company's Act spoke of the alterations of levels in any "street or road." The

Counsel for the Company argued that the quay is a "public place," and therefore a "street" according to the interpretation clause of 1847. Unfortunately for the Company, Mr. Justice Wills, one of the Judges before whom the case was brought, started the idea that the interpretation clause did not apply; the reason given being that the Company's Act said "street or road," and not merely "street." It was held that as "street" meant "road" in the interpretation clause, the insertion of the words "or road" excluded all reference to the definition of the word "street" in that clause. Hence the phrase "street or road" was to be considered as complete in itself, and the words were to be taken in their ordinary meaning. This view was accepted by the other Judge, Mr. Baron Huddleston; and judgment was given for the defendants, with costs, on the ground that the quay was neither a street nor a road, in the ordinary sense of the words. According to this view, had the section in the Company's Act said less, it would have meant more; and it may be confidently stated that the Company never intended the extra word to operate restrictively. Apart from this technical point, the facts of the case would seem to show that the quay is practically a road, and is used as such by the public. The Corporation have gained the day by a quibble; and the result shows once more "the glorious uncertainty of the "law." If an appeal follows, perhaps a different judgment will be given.

GAS, WATER, AND GENERAL INVESTMENT TRUST.—The letters of allotment and regret in the Gas, Water, and General Investment Trust, Limited, were posted last night.

THE FIRE-BRICK INDUSTRY.—A private meeting of fire-brick manufacturers has, it is reported, recently been held at Stourbridge, when it was determined to form a union, with the view of keeping up the prices.

DEATH OF MRS. STEWART.—The professional and other friends of Mr. Samuel Stewart, of Greenock, will sympathize with him in the severe domestic bereavement he has suffered in the loss of his wife, which sad event took place last Wednesday.

THE LONDON COUNTY COUNCIL.—In giving last week a list of members of the new County Council for London having direct interests in gas or water undertakings, we omitted to mention the name of Mr. E. Boulnois (elected for the West Marylebone division), who is a Director of the West Middlesex Water Company.

SOCIETY OF ENGINEERS.—The first ordinary meeting of the Society for this year will be held on Monday evening next, at 7.30 p.m., at the Town Hall, Westminster. The President for last year, Mr. A. T. Walmisley, will present the premiums awarded for papers read during the year, after which the President for the year 1889, Mr. Jonathan R. Baillie, will deliver his Inaugural Address.

INSTITUTION OF MECHANICAL ENGINEERS.—The forty-second annual general meeting of this Institution will be held to-morrow, Thursday, and Friday evenings, in the Lecture Hall of the Institution of Civil Engineers, by permission of the Council. The President, Mr. E. H. Carbutt, having been in office for two years, will retire, and will induct into the chair the President-elect, Mr. Charles Cochrane.

THE ELECTRIC LIGHT IN THE HOUSE OF COMMONS.—An extension of the electric lighting system at the House of Commons is in progress. Hitherto the only portions of the building lit by electricity have been the division lobbies and upper corridors, the library, reading-room, tea-room, smoke-room, and a limited number of other apartments; but when the House re-assembles it will be found that gas has also been superseded in the cloak-rooms and entrance lobbies, and on the main staircase. It is stated that this is the first step towards the general adoption of the electric light at St. Stephen's; and that before long the oil-lamps used in the committee-rooms will be abolished, and electricity substituted for gas in the public corridors and waiting-halls, as well as in the members' lobby.

THE DIVINING-ROD.—In the current number of the *Universal Review*, just issued, Dr. Lauder Brunton has an article on "Truth and Delusion," in which he has the following remarks regarding the popular belief in the divining-rod:—"I am inclined to think that the success of the divining-rod in some hands as an instrument for finding water, or even for tracing criminals, is due to its causing involuntary muscular action, and thus enabling the person using it to consciously recognize that impressions have been made upon him which would otherwise never have risen above the state of subconsciousness. When we hear that a man is able to discover water at a considerable distance below the ground on which he stands, we are at first apt to scout the idea as ridiculous; while if we were told that a caravan was crossing a desert, and that all at once the thirsty camels started off quickly, and at the distance of a mile or more water was found, we look upon the occurrence as quite natural. The same way we regard as remarkable the story of a man tracing criminals with a divining-rod; but it becomes quite ordinary if we put a bloodhound in the man's place."

Essays, Commentaries, and Reviews.

THE AFFAIRS OF THE GAS INSTITUTE.

IN our "Correspondence" columns to-day will be found two letters upon the subject of The Gas Institute and its successor, which call for some notice from us. Mr. A. Thomas's communication ranges over several topics more or less cognate to the present issue. We will dispose first of his remarks directly referring to our own comments upon the condition of the old Institute Council. He accuses us of displaying "a bitter spirit" in the last twenty lines of our article printed on page 153 last week; and of indulging in "bitter sneers" against the members of the Council "simply because they have thought fit to remain in office until June." He thinks such comments hurtful; and we fully agree with him that if his idea of our attitude were the correct one, no good would follow from it for anybody concerned. We entirely and most emphatically repudiate this interpretation, however, and challenge Mr. Thomas and everybody else to quote a single line, to say nothing of twenty lines, in the article in question, or any other of our editorials, which fairly warrants such a reading. The twenty lines referred to by Mr. Thomas describe our views of the relationship between Mr. Bray and the fragmentary Council. Is the description wrong? Mr. Thomas does not attempt to dispute one word of it. Let him refute it; and we will publish the refutation with as much prominence as the original statement, and apologize into the bargain. It seems, however, that the bitterness lies in the truth of our remarks, rather than in any "spirit" which we infused into them. Mr. Thomas may not object to seeing the remnant of the old Institute patronized by Mr. George Bray; but is apparently annoyed at the fact being stated too bluntly. We should be unfaithful to our office if we allowed ourselves to be governed by any considerations of this kind. Whether right or wrong, when we form an opinion or take a certain view of facts, we shall state it in the plainest language at command. In the present instance, it is clearly the facts that should offend Mr. Thomas, and not our presentment of them, the truth of which he does not dispute. He goes on to recognize the source of the present evils of the Institute; but upon the question of the reduction of the old organization to the class of members which he admits ought alone to belong to it, we must refer him to our explanations of the impossibility of such a proceeding, and also to the statement of our other correspondent "Spes," who brings out this point with great precision. The statement of "Spes" is as logical as a theorem of Euclid; and as unanswerable. The rest of Mr. Thomas's letter, in which he deals with the subject of subscriptions, has little to do with the question of the hour; for his grievance is as much against the old Institute as against any possible successor to it. It is to be feared that his aspirations after a graduated scale of subscriptions are as little likely to be gratified as the desire of some well-meaning politicians for Proportional Representation. A good many fixed payments press unequally upon people of differing means; and it is hard to see why gas managers should be the first to attempt to remedy the inequality in the way proposed by Mr. Thomas. His remarks suggest another question, which is, how does the "hard-handed working man," to whom the difference between a guinea and a half-guinea subscription is so serious, according to his account, manage to pay the hotel and travelling expenses necessarily incurred for attending the meetings?

We understand that the late Secretary of the Institute, Mr. W. H. Bennett, has been informed that his resignation has not been accepted by the Council; but that he is suspended from the discharge of the duties of his office. The general subject of The Gas Institute troubles was informally discussed at the recent meeting of the Committee of the Southern District Association of Gas Managers, when beyond an expression of approval of the action of their colleagues who have retired from the Council, it was concluded to leave the matter open for the individual decision of members.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(FOR STOCK AND SHARE LIST, see p. 213.)

BUSINESS on the Stock Exchange during the past week has not been very active or very interesting. Indeed, it ruled rather dull until Thursday, when the Bank Rate (after standing only a fortnight at 4 per cent.) was reduced to 3½ per cent. Choice securities then came into more active demand for investment; and they continue so, as money is abundantly cheap. In the opinion of many, the Bank Directors might well have lowered the rate to 3 per cent. while they were about it; and it will not be long hence before they actually do it. The Gas market has been decidedly active, and on the whole very firm. A large number of stocks have gone up in price; and in some instances the advances are large. Continental Unions are most conspicuous; the £14 paid shares having improved 2, which is a rise of 14 per cent. Since the end of last November, when the increased dividend was announced, these shares have risen 5, besides paying the dividend—equal to a rise of 35 per cent. Among the other Foreign undertakings, Imperial Continental have more than recovered the slight drop they had the week before. Buenos Ayres debentures gained 1; but lost half of it before the close. In Suburbans and Provincials, Brentford old has made further gains; and British has also advanced. Coming to the London issues, South Metropolitan "A" and "B" are each 3 better; and Commercial old and new have risen 2 each. Gaslight "A" is the only stock which has fallen in price. At first it rose 1,

and then a good deal of it changed hands. These realizations induced some reaction, and the quotation fell. The weakness, however, appears to be slight and probably only temporary. The debenture and preference stocks, on the other hand, are higher—in obedience to the demand for first-class investments. Business in Water has been pretty brisk, especially in East London; and several issues have improved their quotations to a slight extent.

The daily operations were: Very fair amount of business in Gas on Monday, and general strength. Both Commercials rose 2; and Imperial Continental, both Continental Union ordinaries, Gaslight 4 per cent. debentures, and Buenos Ayres debentures, 1 each. Water was rather quiet. West Middlesex gained 2, and Southwark "D," 1; but no business was done in them. On Tuesday, Gas was still active. Gaslight "A" and Brentford old improved 1 each, and Imperial Continental, ½; but Buenos Ayres debentures fell back ½. Water was active, without change. Wednesday was noteworthy for extensive dealings in Gaslight "A," which began to show signs of a reaction towards the close. In Water, East London was in some demand, and advanced 1. Gas was again active on Thursday, and ruled firm, except for Gaslight "A," which fell away 1, and closed weak. All three Continental Union issues advanced 1. Water was about the same in point of business; and Chelsea improved 1. Friday's Gas business was largely among the foreigners; but the movements in price were all in the home category. They comprised a rise of 3 in South Metropolitan "A" and "B"; 1½ in Gaslight "C," "D," and "E;" and 1 in ditto "J," and in British. Gaslight "A," however, receded 1. Water was quiet and unchanged. On Saturday, business in Gas was well above the average, with general firmness, except in Gaslight "A," which fell 1 more, and was marked as low as 258½. Water was without any feature to note.

ELECTRIC LIGHTING MEMORANDA.

THE HOUSE-TO-HOUSE COMPANY'S FIRST STATION—PROPOSED CENTRAL STATION FOR MANCHESTER—COMPARISONS OF THE PRICES OF GAS AND ELECTRIC LIGHTING—AN ELECTRICAL SWINDLE.

THE House-to-House Electric Supply Company have done something at last. There was inaugurated on Thursday their first central station, situated on a plot of ground adjacent to the West Brompton Railway Station, and intended for the lighting of houses in the immediate neighbourhood. The reports of Thursday's proceedings which have appeared in the London newspapers make it slightly uncertain as to what the term "inauguration" means in this case, besides the usual dinner and complimentary speeches by the Company's guests. One report states that the work of lighting will be "very shortly" begun at the station; but another account says nothing at all upon this point. It may be inferred that if the station has been opened, it is not yet doing much, if any, actual lighting; and in view of this fact the congratulations upon the Company's success which were the staple of last Thursday's after-dinner oratory seem a trifle premature. Electricians have an incurable propensity for cackling before they have laid their egg—possibly because the egg so often addles after a very brief exposure. The West Brompton Station is described as spacious enough for accommodating twelve sets of lighting plant, each for supplying current to 4000 lamps. It is a transformer system which is to be thus tried; but which form of the principle is to be adopted does not appear. Mr. Robert Hammond is the General Manager of the Company, and greatly felicitated his friends on Thursday that at last electric lighting was to be tried with mains underground, as contemplated by the Electric Lighting Act. The satisfaction is perfectly natural; but it does seem remarkable that the crucial experiment should have been so long delayed.

There has lately been an extraordinary general meeting of the Manchester Edison Swan Company, to consider the establishment of a central station for lighting some part of the city. Up to the present time this Company have only undertaken isolated installations; and as they lost money for several years after beginning business, the Directors very prudently refrained from incurring unknown risks in the way of town lighting. Last year, however, it was thought that the turning point in the Company's fortunes was reached, when a 5 per cent. dividend was paid, with a similar prospect for the current year. Under these happy circumstances the Board have plucked up heart for facing the experiment of a central station; and the recent meeting was for the purpose of ascertaining whether the shareholders were prepared to put down the necessary money for such a venture. The Board had a scheme for setting up in Manchester a central station capable of supplying 10,000 lamps, which it is supposed can be done for £40,000. The annual cost of maintaining such a station is estimated at £8000; and if the whole of the lamps can be let out at an average rental of 25s. per light, the revenue would amount to £12,500, showing a profit of something above 10 per cent. on the prime cost. The Directors volunteered the statement that if they can make 10 per cent. out of this station they will not ask for more, but give the rest away in the form of reduction of rental to consumers. The scheme thus propounded did not meet with the approval of the meeting; but ultimately the resolutions submitted from the chair were adopted, on the understanding that the scheme should be further elaborated and the shareholders called together again before any money is spent upon it. Having lost £30,000 in their six years' work, the proprietors naturally desire to look very carefully into the reasons for any fresh venture requiring money down to start it with.

A correspondent writes to inquire how we can explain the statement which he says is made in two or three places in last week's JOURNAL that "the incandescent electric light is four times as dear as gas consumed in the best modern burners." In comparing two commodities, each of varying cost, with each other, it is necessary to bring them both to some fixed datum. The precise cost of electric lighting as compared with gas for any particular piece of lighting, such as that of a theatre, railway station, or house of business, is not easily put upon record as a matter of historical fact, owing to the difficulties of obtaining reliable and comprehensive figures. The comparison may be calculated out with reasonable accuracy, however, when the cost of the electrical supply is given at per Board of Trade unit, and the price of gas and its illuminating power are also known. Yet even then it is not all plain sailing, because in the case of the electric lighting it is necessary to allow a more or less hypothetical sum for lamp renewals, which, as these articles are worth 5s. each, is no trifle; and in the case of gas we must agree upon the burner selected for the comparison, and its duty in candle power per cubic foot for the gas in question. These points have been repeatedly discussed in our "Memoranda;" and on the basis of data supplied by Mr. W. H. Preece and others, we have arrived at the following rule:—"The price of electricity per Board of Trade unit, multiplied by 13 for incandescent lamps, gives the equivalent cost of gas at per 1000 cubic feet."

During the past few weeks a considerable amount of amusement has been created among people who did not happen to be pecuniarily interested in the speculation by the sudden and dramatic collapse of the so-called Electric Sugar Company of New York. Upon the representations of a certain Professor Friend, a number of people in England and America invested in the shares of the Company, which was to develop a process for converting, through the agency of electricity, cube sugar into pure crystallized lumps of any desired size fit for immediate consumption. The "plant" was very skilfully prepared; and such splendid results appeared to be secured from the experimental working of the Professor's process, that the Company's shares went up from £20 to over £100. The most remarkable feature of the case is that the Professor himself was an enthusiast, who probably deceived himself as much as he deluded the public. While he lived, there was much preparation for carrying out the secret process which he claimed to have discovered; but in the midst of it all the Professor died, leaving his secret with his widow and one or two confidential men at the factory. No sooner had the inventor departed, than his more astute representatives saw that there was no process in his scheme; but instead of dropping it, they carried out a great deception, the effect of which was to force up the Company's shares as already stated, and enable those who were "in the swim" to realize at an enormous premium. Like all great inventions, the plan of operation was extremely simple, consisting merely in buying loaf sugar, smuggling it into the factory as raw sugar, and turning it out of the secret chamber beautifully broken in cubes. In this phenomenally easy way the public was tricked out of a great deal of money. The conspirators kept the game alive until they had raked in all the money they could see a chance of getting hold of under the pretence of "buying machinery," and then they decamped, leaving a common sugar-breaking machine in the secret chamber to represent the electric sugar refining process. It is easy to laugh at the credulity that allowed itself to be victimized in this way; but there is nothing very surprising about the matter. The public hear from time to time of electrical processes for refining metals, purifying sewage, and other purposes; and it can hardly be wondered at that they fail to distinguish between the good and the bad. It may be remarked that investors should take expert advice before parting with their money at a venture; but, to the discredit of experts be it said, many a big name has been seen ere now upon very queer prospectuses; and the public hardly know who to trust. In this case of the electrical refining of sugar, Professor Sylvanus Thompson and the *Electrical Review* raised notes of warning months ago; but it is difficult for one unpaid adviser and a technical periodical to help the public in such a matter when there is so much at stake on the other side.

THE Woodhouse and Rawson Company have just issued a very complete catalogue of contractors' electrical supplies, which will form a useful guide to all who desire to make acquaintance with the most modern forms and patterns of electric lighting apparatus. A former edition of this catalogue has appeared; but the one before us is a great improvement upon it. The list of apparatus is arranged in natural order, beginning with the motor and taking the inquirer through dynamos, wiring, and switches, down to the lamps and other appliances for utilizing electrical currents. There is a large collection of patterns of machinery and fittings to choose from; gas-engines of different makers not being forgotten. There is an amazing variety in dynamos, all being recommended as the very best. The resources of the firm in the way of switches, cut-outs, and wire fittings in general are overpowering. It probably cannot be helped; but it certainly strikes one that the cost of a not very elaborated switchboard, with connections for dynamo, lamps, measuring instruments, &c., is excessive considering the purpose which it has to serve. Incandescent lamps are still dear. The firm recommend 20-candle power lamps to replace gas-burners, the first cost of which is 5s. each. This appears to be the standard price for lamps of any nominal power under 20 candles. Many interior electric light fittings illustrated in this book are very pretty, besides which various forms of pentane lamps and Mr. Vernon Harcourt's photometers are given in the list.

THREE-LIFT HOLDER FOR SYDNEY GAS-WORKS.

DESIGNED AND CONSTRUCTED BY MESSRS. C. & W. WALKER, OF LONDON AND DONNINGTON.

DESCRIPTION OF DRAWING No. 8.*

THE top curb proper consists of two stout angle-irons and a plate, forming a strong plate ring girder. The angle-irons being rivetted on the two outer edges of the ring, it is well suited for resisting distortion horizontally. The angle-irons are 6 in. by 6 in. by ¾ in., and 6 in. by 4 in. by ⅝ in. respectively; the plate being ⅝ in. thick. The ½-inch plate running round the side vertically, as well as the ½-inch plate next to the curb on top, materially assist the curb in resisting the dead compressive strains due to the pull of the top sheets—in fact, they form part of the top curb, as the forty-four strong gussets connect the side to the top so rigidly as to prevent any chance of buckling.

It may be asked why was an angular top curb preferred to the bent plate shown in fig. 1. There are many reasons—(1) Because *rigidity* not *spring* is wanted in that part, which is subject to great compression. (2) The metal in the bent curb is not well disposed to resist the direct pull of the top sheets and side sheets; it is taken out of the angle where it is most wanted. (3) The top carriages are troublesome to shape and attach on a curve, especially if any adjustment has to be provided for. (4) There is a great deal of trouble in bending the plate to suit the curve both ways; the bending takes the nature out of the plates. They cannot be fitted in to exact lengths to suit rivetting, circumferences, &c., so well as the ordinary flat plates. The difficulties are enhanced if lap joints are to be provided for; and if butt joints are adopted, they only butt here and there—they do not butt properly metal to metal, unless very great trouble is taken. It also necessitates curving round the vertical stays, gussets, &c., inside to suit. With the angular curb as adopted, all these objections are avoided.

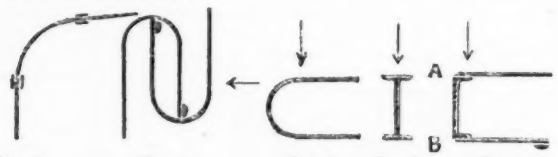


FIG. 1. FIG. 2. FIG. 3. FIG. 4. FIG. 5.

The bottom curb is formed of two angle-irons, 7 in. by 3½ in. by ¾ in.; the 7-inch width being horizontal so as to give resistance to distortion out of circle.

The hydraulic cups and dips are formed of strong channel-irons and plates, as shown to enlarged scale on the drawing. Messrs. Walker prefer these channel-iron cups to the bent plate cups for the following reasons:—(1) What is wanted in the cups is rigidity, not flexibility. The greatest strains on the cups are due to the tendency to distort out of the circle horizontally, due to the side pressure of wind. They must, therefore, act the part of horizontal ring girders; the force coming upon them as indicated by the arrow in fig. 2. Now, no one ever thinks of making an ordinary girder with a curved web-plate as in fig. 3, because it would spring under a very little load; but with a straight web as in fig. 4, to which the channel-iron cup (fig. 5) is an approximation. (2) The metal is better disposed in the channel-iron cup, because the metal is put in the flanges, so to speak, instead of the web—viz., A B (fig. 5)—where there is double thickness, instead of just a single ⅜-inch bent plate. (3) An ordinary quality plate (Middlesbrough iron) will not stand the bending. The plate has to be bent two ways—viz., to the curve of the holder, as well as to the curve of the cup; being made hot and pressed into shape. This destroys to an extent the nature of the iron, as is proved by the plate having to be of better than ordinary quality to stand the bending. The strength of the plate would thus appear to be the difference between the qualities. Messrs. Walker only use best Staffordshire iron throughout their holders, which, of course, stands the bending; but still they assert from having made a large number of gasholders, both with bent cups as well as channel-iron cups that the latter is far more reliable and stronger in every way, because the fibres of the iron have not been subject to tearing due to the excessive bending. (4) The joints of the channel-iron cups are butted; the ends being faced perfectly smooth, so that they bear all across the section, and are well united by long joint covers. In the bent cup, the joints are entirely lapped; so that the thrust all comes upon the rivets, which is not so good. (5) The carriages, both on the cup and dip, are very much more awkward to adapt and fix; the bases having to fit the curve, and there is less substance to bolt them to. (6) It may be argued that the "bent" cups are cheaper to make; but the saving is so slight, either in weight or work, that it is scarcely wise to sacrifice durability and strength for the sake of a little extra cost.

The vertical stays in the inner lift are formed of rolled joist iron. There is no awkward twisting or cutting of these stays; one saw-cut at the top, on the bevil, being all that is required, and answers the purpose quite as well as if the top had been trimmed to fit exactly all round the angle-iron curb, &c. It is well attached for its entire length to the strong vertical strip of the side sheets, and is further attached to the top curb angle-iron by wing gussets as shown on the drawing. This gives it stiffness sideways. In front of each of these 44 stays are the triangular shaped gussets uniting them to the top curb plate, and the other angle-iron of the curb; thus making the angle between the top and the sides very rigid and strong. It will be noticed that these gussets are made without any welds or unnecessary bending of the angle-irons.

The channel-guides in the middle and outer lifts are 6 in. by 3½ in. by 3½ in. by ½ in., and are likewise attached to the vertical strips; thus increasing their strength sideways, as well as distributing the strains to better advantage. They are firmly attached top and bottom; and the bottom ends project, in order to suit the rollers on the underside of the cups.

The top roller carriages are simply plate cantilevers with the edges stiffened up by angle-irons and braced sideways. The whole carriage can be adjusted to and fro without disturbing the bolts in the curb plate. As will be seen by the drawing, the bolts are countersunk into the thick curb plate; and the nuts on the inside make the bolts a fixture, so that they neither tumble into the holder if the nuts outside are removed, nor allow of any gas escaping when adjusting the carriages. The old cast-iron carriage base is done away with, as it only makes places for water to lodge and rust away the curb, &c. The dip carriages on the middle lift are as wide as possible in the base, for which purpose they are raised on a solid cast-iron distance block and front angle-irons; otherwise, owing to their width, they would come in contact with the carriages or dip of the outer lift. This also takes a better hold of the dip, and reduces the leverage on the carriage-plates. The outer lift carriages are also broad based, and very sturdy. Bosses are welded on the cheeks of the roller-carriages, to give a good bearing for the axles, and make a strong job.

The cup-rollers on the middle and inner lifts are as large as can be conveniently got in; and for this reason they were put *below*, instead of on the *sides* of the cups. The bottom rollers on the curb of the outer lift have cast-iron cheeks. They are made in halves, for convenience of fixing, and packed out with oak packing, to suit any little irregularities there may be in the diameter of the tank, so as to bring the rollers home to the tank-guides.

In drawing these articles to a conclusion, we may state that the iron used in the construction of this gasholder was of the best Staffordshire brands. The weights of the three lifts respectively are as follows:—Inner lift, 275 tons; middle lift, 119 tons; and outer lift, 119 tons. The total weight of the guide-framing, including the tank-guides, holding-down bolts, and inlet and outlet pipes is 472 tons. Therefore the entire holder weighed about 985 tons. The heaviest piece to be lifted at one time was the bottom length of the standard, which weighed about 3¼ tons. The pressures given by the holder are—

	Pressure per Sq. Ft. in Pounds.		Inches of Water.
When the inner lift only is inflated . . .	19·807	=	3·82
When the inner and middle lift are inflated .	28·378	=	5·38
When all three lifts are up	36·949	=	6·94

Or, roughly, 37 lbs. pressure per square foot due to gas, equal to (say) 7 inches of water.

All parts of the holder—the girders, ties, &c.—were made to *exact* calculated lengths; and everything went together perfectly in the erection, without the slightest alteration being necessary. The gasholder was completed last year; and we understand that Messrs. Walker have since erected another of similar design in Toronto, Canada. In the Toronto gasholder, however, the guides up the front of the standards are of channel-iron, the same section as the guides in the tank, with which they are in line. This is a better plan than the rail, as it not only makes a continuous path for the gasholder from top to bottom, but also allows of the roller-carriages being kept much lower, as the carriages on the dip of the outer lift can be put on the side, instead of the top. This was done; thereby reducing the leverage on the carriages above.

Having concluded the descriptive articles, we shall, in our next issue, reproduce the specification of the gasholder as originally drawn up by Messrs. Walker.

* In this drawing, which appeared last week, a correspondent calls attention to an evident mistake in stating that the "section of I-iron stay, showing attachment of gusset-piece" was full size.

WATER BILLS FOR 1889.

LAST week we gave various particulars of the Water Companies' schemes to be brought before Parliament during the forthcoming session by means of Bills. Below are somewhat similar details of Corporation Bills.

The Barrow-in-Furness Corporation Water Bill is to empower the Corporation to extend their undertaking by the construction of a dam across the River Duddon, a settling pond, and the necessary pipe lines, to be completed within 7 years. Powers conferred by an Act of 1875 for the taking of land, and allowed to lapse, are to be revived; and the time allowed for the completion of works authorized by the same Act is to be extended to 10 years from the passing of this year's Act. The Corporation desire to borrow £65,000 for the purposes of their water undertaking, besides the sum of £10,000 for the working capital of their gas and water undertakings. It is also in contemplation to form a water reserve fund, which is not to exceed £35,000. The Belfast Water Bill is to authorize the Commissioners to borrow £170,000, to be repaid in 60 years. A sum not exceeding £30,000 is to be laid out upon mains, pipes, and fittings. The Bill contains provisions for the creation of stock. The works are to be extended by the damming of the Carr's Glen river, and the construction of filter-beds, basins,

and tanks, including an impounding reservoir upon the Leathemstown river. Compensation water is to be provided down the channels of the impounded streams. The works are to be completed within 10 years. A clause is inserted dealing with any complaints of supplying unwholesome water which may hereafter be brought against the Commissioners. The Burnley Corporation Bill contains a part relating to water. It is desired to extend the limits of supply and make them co-extensive with an enlargement of the borough contemplated in the Bill. The powers of supplying water at present exercised by the Padiham Local Board with regard to the township of Habergham-Eaves are to be repealed in favour of the Corporation; and the Corporation are to purchase the mains and property of the Local Board in the district named. The Bury Corporation Bill is to enable the Corporation to borrow £130,000 for the purpose of enlarging their water-works by the construction of an impounding reservoir upon the Whitewell Brook. Compensation water is to be provided. There is a clause which states that in case of deficiency in the water revenue, supposing the maximum rates to be charged, the balance may be made up by increasing the Bury general rate. After all charges are defrayed out of revenue, any balance of profit is to go to reducing the rate. The Deanhead Commissioners' Bill is to enable the Commissioners to raise £6000 on mortgage, and to construct a new service tank and pipe lines, to be completed within 5 years. The Commissioners seek to be empowered to make contracts for supplying water to certain public bodies, with the restriction that they must not sell altogether more than 60 million gallons of water a year. The Edinburgh and District Water Bill is to enable the Trustees to borrow £50,000 on mortgage. The Heywood Corporation Bill is to extend the time allowed in an Act of 1877 for the construction of certain water-works, and to enable the Corporation to borrow £25,000 for the purposes of their water undertaking. The Hythe Corporation Bill is to authorize the borrowing of money (the amount to be determined by the Local Government Board) for their water-works, including additional land, and a spring thereon. The Liverpool Corporation Bill includes provisions for preventing waste of water. The Manchester Corporation Bill is to authorize the Corporation to acquire more land and to construct roads and other subsidiary works in connection with their Thirlmere water scheme. The Newry Improvement Bill contains clauses authorizing the Commissioners to license plumbers and make regulations as to water-fittings. The Padiham and Hapton Local Board Bill is to enlarge the area of the Board, and to authorize the construction of new water-works comprising a compensation reservoir on the Woodhouse brook, the sum of £50,000 being borrowed for this and other water-works purposes. The Swansea Corporation Bill is to extend the time allowed for the completion of the Upper Lliw reservoir, and to enlarge the limits of supply. The Tunbridge Wells Improvement Bill contains a part relating to water-supply. Rates are to be paid half-yearly in advance. Power is desired to create a water-works renewal fund; and there are sundry other clauses dealing with details of administration. The Wakefield Corporation Bill is to extend the time allowed by an Act of 1880 for the completion of certain water-works, and to authorize the construction of others, including three impounding reservoirs and one service reservoir, to be completed within 10 years. The sum of £170,000 is to be borrowed for water-works purposes. The Wigan Borough Extension Bill is to authorize the creation of corporation stock, and adjust the existing Acts relating to water supply to the extended borough.

GAS AND WATER ORDERS FOR 1889.

The following Provisional Orders relating to gas and water supply have been submitted to the Board of Trade:—

The Buckley Gas Order is to empower the Buckley Gas Company, Limited, to supply gas in a district lying within a radius of 1½ miles of the junction of Church Road, in the township of Bistre, Flintshire, with the Chester and Mold main highway. The capital of the undertakers is to be £5000, with power to borrow one-fourth of the amount paid up. Gas of 14-candle power is to be supplied, at the standard price under the sliding scale of 6s. per 1000 cubic feet. The annual statement of accounts is to be made up to Sept. 29, and supplied to local authorities on or before Dec. 25, instead of the dates mentioned in the 35th section of the Gas-Works Clauses Act, 1871. The Market Rasen Gas Order is to empower the Market Rasen New Lighting Company, Limited, to supply gas in the parishes of Market Rasen and Middle Rasen, Lincolnshire. The share capital of the undertakers is to be £7000, to consist of £4500 of original, and the balance of additional capital, to be raised under the auction clauses, with power to borrow one-fourth of the amount paid up. Additional land is to be acquired. Gas of 15-candle power is to be supplied, at the initial price of 5s. per 1000 cubic feet. The Melton Mowbray Gas Order is to empower the Company named to supply gas within the parishes of Melton Mowbray and Thorpe Arnold, Leicestershire, with a capital of £25,000, to include £18,000 of original, and the balance of new capital, with the usual proportion of borrowed money. Fourteen-candle gas is to be supplied, at the maximum price of 5s. per 1000 cubic feet. The Otley Gas Order is to empower the Otley Gas Company to supply gas to the district named, which is in the West Riding, with a capital of £30,000, of which £20,000 is original, and the rest is to be raised under the Order. The usual borrowing powers are asked for; and additional land is required. It is desired to supply gas in bulk to public bodies and others in the district. Gas of 15-candle power is to be supplied, at the standard price of 3s. 9d. per 1000 cubic feet under the sliding scale. The Romford Gas Order is to authorize the Company to enlarge their works, and to raise £13,000 of additional capital, which will bring their total capital up to £30,000, with power to borrow one-third of the amount of share capital raised. It is desired to be enabled to sell gas in bulk, and to make or deal in gas stoves, meters, &c. The Ross Improvement Order is a Local Government Board Order, drafted with a preamble, reciting that the Improvement Commissioners of the district of Ross, in the County of Hereford, sold under an Act of 1865 their gas-works to Mr. James Harris, of Hanwell. It was provided in this Act that, if, at any future time, the said James Harris should feel disposed to sell the works again, the Commissioners were to have the first offer of them. Mr. Harris improved and enlarged the works while they were in his hands; and on Sept. 25 last, his devisees made an offer to sell the property to the Commissioners, as aforesaid, which offer was accepted, subject to the approval of the Local Government Board. The Commissioners sanction for raising the necessary funds. The St. Ives (Hunts.) have power to supply gas under their Act of 1865; but require Gas Order is to empower the Company to supply gas, with a capital consisting of £10,000 original and £5000 additional; with borrowing powers to the extent of one-fourth of the capital raised. Additional land is to be acquired. Gas of 15-candle power is to be supplied, at the standard price under the sliding scale of 5s. per 1000 cubic feet. The Warminster Gas Order is to incorporate a Company supplying the parishes of Warminster and Bishopstow, Wiltshire. The capital is to be £8000 original, and £8000 additional; with power to borrow one-fourth. Further land is to be bought; and 15-candle gas supplied, at a maximum price of 4s. 6d. per 1000 cubic feet for Warminster, and 5s. beyond.

The Brightlingsea Water Order is to incorporate a Company for the supply of water to the place named, on the Essex coast. The capital is to be £5000, with the usual borrowing powers. Rates for domestic supply will vary from 7½ to 5¾ per cent. The works authorized comprise the reservoir, &c., belonging to the Company, situate in Well Street and Park Road, Brightlingsea. The Corsham Water Order is to empower the Corsham Water Company, Limited, to construct and maintain water-works, and to supply water in the parishes of Corsham, Pewsham, and Lacock, Wiltshire. The capital is to be £4000, with the usual borrowing powers. The authorized works are to include six catch tanks and the necessary pipe connections. The rate for domestic supplies is to be 7½ per cent. on rental. Power is desired to sell water in bulk within or without the limits of supply. The Faversham Water Order is to incorporate a Company now supplying water with a radius of 1½ miles from the Town Hall of the borough of Faversham. The capital is to be £18,000, consisting of the original capital of £12,000, and the balance to be raised; but there is no mention of the auction clauses. Power is desired to borrow to the extent of one-third of the paid-up capital. The water-works comprise three well-shafts and pumping-engines, two reservoirs, &c. The rates for domestic supplies are 5 per cent. and upwards. The Harpenden Water Order is to authorize the continuance of the undertaking for the supply of water in the parish of Harpenden, in Hertfordshire, belonging to three persons who are named. The capital is not to exceed £10,000, of which the sum of £4470 has been already expended. Power is required to borrow £2500 upon the property, which is described as personal, and not real estate. The works to be authorized consist of wells and a pumping-station and service reservoirs. Provision is made for the protection of the Midland and Great Northern Railways. Rates not exceeding 3¾ per cent., with one-third more for inns, are to be levied for domestic supplies. The Llandrindod Wells Water Order empowers the Company to raise £1000 of additional capital by the issue of preference 6 per cent. shares, and to borrow £500 on mortgage. Permission is sought for the issue of debenture stock. The Marlow Water Order is to authorize water-works at Great Marlow and the neighbourhood, in the counties of Berks and Bucks. The share capital of the undertaking is not to exceed £16,000, with the usual percentage of loans. The works consist of a well and pumping-station with reservoir and tank in a certain chalk pit. Rates for domestic supplies are to range from 7 to 6 per cent. on the annual value of the premises supplied. The Pocklington Water Order is to enable the Company to supply water within so much of the parish of Pocklington, in the East Riding, as lies within a radius of half a mile from the north corner of the Church. The share capital of the undertaking is not to exceed £3000, with power to borrow £1000. The water-works to be authorized consist of a collecting chamber at or near a spring, with reservoir and other works on the Chapel Hill in Pocklington parish. Rates for domestic supplies are set out at length for different rentals. Power is required for selling water in bulk.

In connection with pending petroleum legislation, Colonel Majendie, C.B., has requested Sir Frederick Abel, C.B., and Mr. Boverton Redwood to report to him as to the extent to which manufacturers of mineral oil-lamps have voluntarily adopted the suggestions for the construction of such lamps issued in 1885 by the Metropolitan Board of Works, on the basis of recommendations made by Sir Frederick Abel and Mr. Redwood, after their experimental investigation of the causes of lamp accidents. Reference was made to these experiments in the course of an article, entitled "Dangerous Oils," in the JOURNAL for April 7, 1885.

Notes.

The Admission of Feed Water to Boilers.

The question of the proper place for the introduction of the feed water into a steam boiler is a matter upon which opinion may not be settled, but in respect of which practice is tolerably uniform. The subject was brought forward by M. Plumier, at a recent meeting of old students of the Liège school, when the usual methods of admitting water to boilers were passed in review. M. Plumier specially controverted the generally accepted principle that the feed should enter into the coldest part of the boiler, or that which is the last to receive the current of heating gases. The author contended that an examination of the facts demonstrates this to be a bad rule, which should be altered as speedily as possible. The sheet iron of a boiler has very nearly the same temperature as the water which wets it. It is not advisable, therefore, that the feed should be so disposed that hot and cold water form superposed layers; for in this case it necessarily follows that the plates in immediate contact with the feed water, which lies at the bottom by virtue of its greater density, and especially those near to the point where the feed enters, must sometimes be at a temperature considerably below that of the rest of the boiler. There consequently follows an inequality of tension between the upper and lower sheets, which racks the joints and disposes them to leak, whence rusting and the rapid deterioration of the boiler ensue. Many examples taken from practice show, according to M. Plumier, that the indications of this theory are exactly fulfilled in the working of boilers. The conclusion arrived at is, therefore, that the object to be sought is the immediate mixing of the feed water with the hot water of the boiler, so as to prevent the former from spreading as a layer at the bottom and remaining there for any length of time at a comparatively low temperature. The question follows, Where should the feed enter? The Engineers of the Boiler-Owners Association advise that the end of the feed pipe should be turned up and led into a small trough in the steam space of the boiler. The water then overflows the edges quietly and without jets. Others let the feed into a chamber more or less long, where a great deal of mud is precipitated; for water suddenly raised to a high temperature throws down salts held in solution. Feeding direct into the water space has not this advantage, of precipitating the mud; yet, notwithstanding, many steam-users hesitate to feed direct into the steam space for fear of the pressure falling quickly during feeding, and that a tumultuous ebullition should take place. All these remarks apply to rather primitive styles of boiler design and management; and M. Plumier sums up his disquisition by stating that a boiler should always be fed regularly, instead of in heavy infrequent doses, but leaves it uncertain how this had better be done.

Elastic Vibratory Bases for Machinery.

The use of motor engines (gas or steam) in buildings used as dwellings, schools, &c., is often hindered by the tremor and noise that commonly emanate from such machinery, to prevent which by isolation is sometimes a difficult problem in engineering. It is generally agreed that if the vibration of moving machinery could be neutralized by placing it upon an elastic base, and preventing any rigid connections with the walls, floor, or roof, there would not be any trouble in buildings from this cause. For engines, a thickness of sheet india-rubber, or several thicknesses of felt have been interposed, not always with success, between the bed and the floor. The subject was discussed generally in a recent communication of M. Anthoni to the French Society of Civil Engineers. India-rubber, as M. Anthoni remarks, although very useful, cannot be always depended upon, because its use as a complete isolant involves the sacrifice of some rigidity and consequently of stability. If holding-down bolts pass through the elastic bed, the vibration passes through the bolts; and the isolation is destroyed. M. Anthoni claims to have solved the problem by making the engine-bed very heavy; and carrying it upon a cast-iron base plate, which bears upon a number of india-rubber rings resting upon a lower plate. There are no holding-down bolts required. A box filled with sand would serve for the purpose. The pipe connections of motors so erected are wound in a special curve to allow of the horizontal oscillation of the bed with all that it carries. The mass of the bed block thus isolated should be about 20 tons.

The Utility of Sugar in Mortar.

Mr. Samuel Crompton, of Cranleigh, Guildford, has written to the *Engineer* upon the effect of the addition of saccharine matter to mortar, and upon building during frost. He lays down the proposition that newly ground lime is the best form of lime for building purposes; and states that from 1 lb. to 2 lbs. of coarse brown sugar is sufficient for each bushel of lime, to be gauged with two bushels of sharp sand. During a recent frost, two rows of brickwork were set in mortar gauged with 2 lbs. of sugar to the bushel of ground lime; and the frost did not affect the work. Other work in the same wall done with ordinary mortar at the same time suffered severely. Some coarse, unrefined treacle worth 10s. per cwt. would be an excellent material, used in the proportion of 1½ lbs. to the bushel of lime. Mr. Crompton thinks that powdered flint as a substitute for sand will be largely used for good work in the future, as broken flint and broken slag will be for concrete work. The flint should be ground into grains the size of those of the best building sand. Setting aside the question of sugar, and considering flint only as a substitute for sand, the uncertainty that at present exists respecting the nature of the sand employed in building would thus be wholly removed. Mr. Crompton protests that if any architect orders lime to be slaked for every day's work, and mixed into mortar for use during the day, he is ignorant of the most elementary principles of dealing with lime. It should be mentioned that, if sugar is added to mortar already made, it will become too thin. If much sugar were used, the mortar to which it was added would run off the mortar board. Sugared water dissolves lime, if strong; hence the importance of first dissolving the sugar, and then adding the sugared water slowly and cautiously to the lime. The mortar should be as thick as it can be used. According to experiments that seem to have been conducted by different people under Mr. Crompton's supervision, the sugar makes the mortar set quickly and hard, like cement, and enables it to resist frost, and also to set in the hottest and driest weather. Moreover, it is claimed that, with sugared mortar, it is not necessary to wet the bricks. For inside plastering, as well as white-washing, the addition of sugar is said to be a great improvement; the proportion for the latter purpose being 1 lb. of sugar to 16 gallons of water. Professor A. J. Herschel reports after a series of experiments that "the effect of sugar in lowering and graduating the congelation-point of water and of lime water, and in diminishing their rates of expansion in solidifying, is very strong, and of such obvious practical utility in making mortar prepared with syrup-water workable in time of frost, when the thermometer is several degrees below 31° Fahr., or the freezing point of ordinary lime water, that no winter weather of usual severity need be a material check or hindrance to carrying on building operations with cements and mortars in open air," if a moderate proportion of sugar is used with the water by which the mortar is gauged.

Communicated Article.

THE CHEMISTRY OF ILLUMINATING GAS.

By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S.

V.

It will be interesting to compare the experiments quoted in the last article with others of recent date. Some very careful experiments were made in Germany, rather more than a year ago, on the light-giving power and cost of various illuminants.* A refined petroleum, known as Kaiser oil, the specific gravity of which was 0·796, and therefore very similar to that used by Messrs. Hartley, Silber, and others, was subject to examination, with varying results. The highest duty obtained from the oil was represented by a consumption of about 51 grains per hour per candle power. The height of the flame must be very carefully regulated in order to secure the best results. A series of experiments was arranged to elucidate this point; and the illuminating power ranged from 12·7 to 18·9 candles, according to the height and condition of the flame. The rate of consumption fell off somewhat at the lower limit, but not in anything like an equal proportion to the light yielded. A large number of tests were conducted with batswing, fishtail, Argand, Welsbach, Siemens, and Wenham burners; and it should be mentioned that the experiments were not confined to the horizontal line of sight, but also included angles of 25°, 30°, 45°, 65°, and 90°. In no case were the results realized so good as those obtained with English gas; the best being a duty of about 9 candle-hours per cubic foot of gas consumed. The highest results obtained with the electric lamps were a duty of 2310 candles with the arc, and 169 candles with the incandescent, per horse-power developed.

Some experiments have also been carried out in France, by members of the Société Technique de l'Industrie du Gaz, with the "Lampe Belge."† The oil used had a specific gravity of 0·805, and cost something like 2s. 4d. per gallon. The value of the light yielded was 3½ Carcels (33 candles); and the consumption of oil was about 1500 grains per hour. It will be observed that the consumption per candle-hour was less than that obtained in Germany; being 45·7 grains against 51 grains per candle-hour. Another lamp yielded rather better results. Mr. Lewis T. Wright remarks‡ that the "Lampe Belge" affords a light equivalent to 1000 candle-hours, with a consumption of two-thirds of a gallon of petroleum oil; and this represents a much higher duty than those above recorded, as the consumption per candle-hour would only be about 38 grains. This gentleman also found that a duplex lamp burning cheap paraffin oil yielded a light equivalent to 1000 candle-hours with a consumption of 0·7 gallon; and the same lamp, using petroleum oil, required nearly a gallon to produce a similar effect. Mr. J. T. Lewis, of Wellingborough, has made some very elaborate tests of the duty afforded by petroleum lamps, using the best American petroleum, the cost of which was 10d. per gallon retail, and also Russian petroleum, which is rather cheaper.§ The Argand lamps tried included wicks ⅝ inch, 1¼ inch, 1⅜ inch (two kinds), and 1⅞ inch diameter; the results obtained being a consumption of 49·74, 46·57, 46·31, 38·67, and 44·79 grains of oil per candle-hour respectively. Some duplex and single flat-wick lamps were also tested; and the average of the whole is a consumption of 44·62 grains of oil per candle-hour.

We are now able to take a survey of the position of illuminating gas in an economical sense, in regard to candles and oil; and it

* See Journal, Vol. L., p. 840.
† *Ibid.*, Vol. L., p. 1049.
‡ *Ibid.*, Vol. LI., p. 1003.
§ *Ibid.*, Vol. LI., p. 913.

will be evident, from a perusal of the extracts cited above, that the only competitor that can come anywhere near it, in point of cost, is petroleum. The history of this substance as an agent for artificial lighting is interesting. On the one hand, we have great improvements in lamps. The best results recorded by modern experimenters are those obtained by Mr. Wright and Mr. Lewis—viz., about 38 grains of oil per candle-hour. Dr. Stevenson Macadam, in 1872, approached very near to them; but the other experimenters are very far behind them. Then there is the low price at which petroleum is now retailed, and at which it is likely to remain. If anything, it will be cheaper. At the present day, petroleum, when burnt under skilled supervision in the laboratory, so as to yield its utmost value, shows far better results than those obtained from gas-burners as ordinarily used by consumers. Gas engineers complain of the ignorant or slovenly way in which gas is used, which prevents the consumer from realizing anything like a proper illuminating value from it; and there is good reason to believe that the same is the case in a greater degree with regard to the use of petroleum. If a consumer buys a suitable gas-burner, all he has to do is to keep it reasonably clean. But after the maker has done his best for the user of petroleum, a great deal depends upon the skill exercised in adjusting the wick. In the first case, nothing is left to the judgment or care of the user; in the second, a great deal depends upon him. So it evidently will not be fair to take the results obtained in the laboratory as evidence of those which a consumer may expect to obtain under every-day circumstances.

Whilst great improvements have been made in candles and lamps, enabling them to yield a brighter, whiter, and steadier light, gas-burners remained almost in a state of quiescence for several years. This position of affairs has been rudely disturbed within the last decade; and the activity in connection with incandescent and regenerator burners is such that the illuminating power of gas has been increased three or four fold. Ten years ago, Mr. Hartley valued the illuminating power of coal gas at from 2·4 to 3 candles per cubic foot. Now Mr. Sugg has shown the possibility of obtaining—not under laboratory conditions, but in actual practice—as much as 13½ candles per cubic foot. The various kinds of regenerator burners yield from 6 to 10 candles per cubic foot under ordinary conditions. With the help of modern improvements, gas is again considerably ahead of its competitors as the cheapest as well as the most conveniently applied of artificial illuminating agents. A modern petroleum lamp, yielding a bright white light equivalent to 30, 40, or even 60 candles, is a powerful competitor with gas at 3s. or more per 1000 cubic feet, used through the medium of ordinary fishtail or batswing burners. When gas was first introduced, its illuminating value was lauded to the skies. It was compared to "noonday sunshine;" and similar extravagant similes were employed in reference to it. These comparisons were made by persons used to "tallow dips" and oil-lamps very far behind those of the present day. If gas were introduced now, for the first time, in this year 1889, its quality would not be so highly thought of. It would possibly be called "dingy" and "yellow" by people accustomed to 30-candle oil-lamps. Under these circumstances, it behoves all interested in the gas industry not only to maintain, and if possible improve, the present quality of the gas, and to sell it at the lowest price, but also to develop, by all the means in their power, the use of improved burners.

As it might be expected that an examination of the claims of electricity as a competitor with illuminating gas should be entered upon here, a few words of explanation on that subject may be necessary. In the first place, there is no general unit of electricity, that can be employed in a popular way, corresponding with pounds of candles, gallons of oil, or cubic feet of gas. So it is only possible to compare it with other illuminants on the basis of cost. All available information as to the cost of the electric light is necessarily of a disjointed character. At the best it is only the result of an individual experiment; and sometimes a very tall structure of assumption and guess work has been raised upon a very narrow basis of actual fact. What we want, in order to obtain reliable data on this point, is something corresponding to the half-yearly accounts of a statutory gas company, in which the whole of the receipts and expenditure are plainly set out. But this is not forthcoming. Most of the electric light enterprises have depended not only on the supply of light, but also on the sale of licences, machinery, &c., for their revenue. Several of the gas fraternity in America have turned their attention to this new lighting agent, and are supplying it with various degrees of success, according to the local price of gas and other circumstances. But although these gentlemen are willing to give general information as to the price at which the light is supplied, the cost of plant, &c., there is a certain reticence about publishing a "fair and square" yearly statement of accounts; thus leading one to suppose that the profits either furnish a "snug little bonus" for the shareholders, or else do not come up to expectations. So far as it is possible to judge in a general way, the adoption of electricity is likely to be decided on considerations other than those of economy; and there is no reason for regarding it as a dangerous competitor of gas. Several interesting reports upon its cost, as compared with gas, have been published, of which that prepared by Mr. G. R. Strachan, Assoc. M. Inst. C.E., District Surveyor of the parish of Chelsea,* on the proposed lighting of the new Town Hall, may be instanced as an example.

* See JOURNAL, Vol. LI., p. 636.

Register of Patents.

GENERATING HEATING AND ILLUMINATING GAS.—Hutchinson, H., of Cannon Street, London. No. 17,799; Dec. 27, 1887. [8d.]

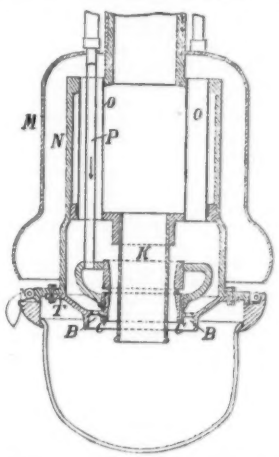
This invention refers to the construction of apparatus for "the generation of heating and permanent illuminating gas from solid fuel, superheated steam and air, and liquid and solid hydrocarbons."

The patentee uses any of the well-known forms of gas generators of the cupola type; and in it are placed near the bottom, a "central steam and air superheater" made in the following manner:—In the centre of the generator is placed a central open-end blowing-tube (connected with a steam-jet air-injector), of suitable dimensions, of iron, earthenware, or fire-clay); and over the blowing-tube is placed another superheating cap, dome, or cover closed at the top, and of larger dimensions. Perforations are made in the base of the outer superheating dome, for the exit of the superheated steam and air into the surrounding incandescent fuel; and by this means there is generated a much larger quantity of water or other gas without employing the usual external superheater.

When it is desired to produce illuminating gas, as well as heating gas, one or more steam, air, or other injectors are placed around the outside lower part of the gas generator; and in such a way as to allow of the forcing into the incandescent fuel undergoing gasification some liquid hydrocarbon or tars. This decomposes the hydrocarbons and tars into illuminating gas in the presence of the nacent water or other gas.

REGENERATIVE GAS-LAMPS.—Vale, H., of Hamburg. No. 5400; April 18, 1888. [8d.]

According to this invention, the gas-burner, air ducts, &c., near thereto and the gas-feed chamber for the burner are constructed as follows:—A casting is made comprising in one piece an annular cylindrical portion forming the inner wall of the gas chamber, and having an annular groove around its outer face. Below the groove a number of bores are made terminating above in the groove and debouching below along the lower rim of the annular portion, preferably through small



conical or cylindrical nozzles. There is a spreading portion at the lower outer face of the annular portion, connected thereto by a web perforated with a number of holes B, preferably each adjacent to one of the gas bores, and terminating outwardly in a flange T to be bolted to the dome. This forms the outer wall of the downward air-feed duct; so that the spreading portion forms a cover below the dome to direct the air-feed to the holes B, or that portion of the air supply which does not pass down within the annular portion. This annular portion is screw-threaded on its outer face, to receive the second portion of the lamp body, which is annular, and spreads outward at the centre and screws on the lower part of the body, so as to form with the upper part the gas chamber which supplies the bores. The inner wall of the inner air-feed passage is formed by the lower part of the chimney K. The dome N, bolted to the flange T, extends upwards, and is connected to the upper part of the chimney by a re-entering portion, perforated at intervals for receiving the ends of the pipes O, which extend downward to a cross partition in the dome, centrally perforated for the attachment of the lower part of the chimney, and also perforated for the reception of the lower ends of the pipes O. The upper part of the dome, therefore, forms a chamber for the products of combustion; and the pipes O passing through the same are thereby heated. The air for feeding the flame passes down through the pipes into the lower part of the dome, which thus forms an air chamber, heated also by the chimney. The dome may be enclosed by a bell-shaped dome M connected above to the chimney and open below. The gas-feed pipe P passes down through one of the pipes O to the burner chamber as shown.

PURIFICATION OF COAL GAS.—Walker, W. T., of Highgate. No. 14,925; Oct. 17, 1888. [8d.]

This invention has reference to apparatus for purifying coal gas—such as that described in patent No. 1478 of 1880—in which surfaces are alternately submerged in liquid and lifted therefrom by a vertical reciprocating dipping movement; so that when raised they present a freshly wetted surface to the gas to be purified which passes in contact therewith. Apparatus of this description, says the patentee, is very liable to become clogged and inoperative, by the accumulation of dense matters; and it is the object of the present invention to overcome this objection, to reduce the first cost of the apparatus, to simplify it, and generally to render it better adapted for use.

Figs. 1 and 2 are elevations at right angles to each other (the lower parts being in section) of apparatus arranged according to the invention.

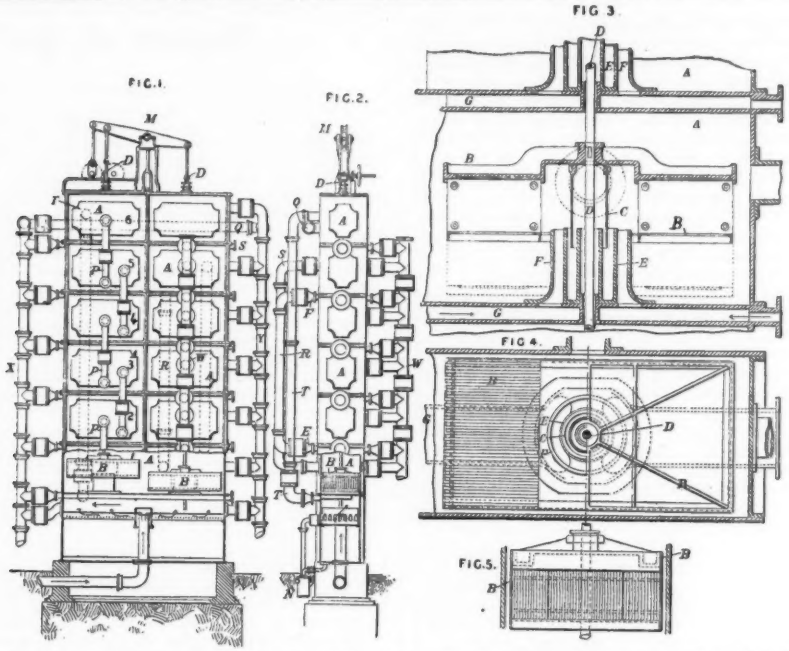


Fig. 3 is an enlarged section of a part of the same. Figs. 4 and 5 are other details.

Boxes B, preferably of cast iron, are made to contain the wetted surfaces; the boxes being open at the bottom. They are operated by a reciprocating vertical dipping movement; so that as reciprocated they are at each downward movement entirely submerged, so that the liquid scours and washes the surfaces and clears them of any thick or dense matter, which is carried freely from off, and discharged clear of them. The surfaces contained in the boxes are preferably made of either plain iron plates or thin boards of wood connected together in groups by bolts with distance pieces between them to keep them the proper spaces apart. They are set vertically, and have an open way between to allow them to be well washed. The spaces are entirely free and open at bottom as shown in fg. 5; and there is preferably a space between the tops of the plates or boards and the top of the box B (as in fig. 3) to allow of the passage of the washing liquid.

Thus arranged, the apparatus is adapted for purifying the gas as it passes from the condensers to the purifiers; and it is made suitable for use for purification either at that stage or at the stage whereat the present mode of purification by oxide of iron or lime is performed, or at both stages. This is effected by isolating the interiors of the superposed tanks A from each other by a water-tight seal, consisting of an inverted bell C secured to the casting B, and that in turn secured to the operating-shaft D. The bell C dips into a vessel E (secured to the tank) containing liquid; so that the joint is maintained by the liquid as the shaft reciprocates vertically. The gas-inlet passage to each tank is at F, external to the seal, and between the opposite sets of wetted surfaces; and it receives the gas to be purified preferably from a flat connecting passage G beneath each tank, and with a mouth at each side of the machine—one for the attachment of the branch from the inlet main, and the other for facilitating cleaning.

As the machine has each of its superposed tanks A isolated one from the other, and so constructed as to bring its inlets and outlets to its exterior, it can be arranged with a system of connecting-pipes and valvular arrangements enabling the gas to be purified to be brought into communication with any chemical agent in any of the tanks and in any desired order. Thus the gas, after having its tar extracted in the lowermost portion of the machine, may be conducted from No. 1 tank through all the tanks above to No. 6 tank; or either of the tanks may be bye-passed, or the gas conducted so as to work right round in a circuit. For example, it may be conveyed first to tanks Nos. 5 and 6; and thence to tanks Nos. 1, 2, 3, and 4. Or for a special process of purification—such, for example, as that of Claus—the gas, after having the tar extracted in the washing chamber in the lowermost part (by means, for example, of apparatus made according to patent No. 3619 of 1881), may be conducted thence successively to tanks Nos. 1, 5, 2, 3, 4, and 6, to be brought in contact with particular chemical agents contained in the tanks, so as to effect the purification of the gas from impurities—carbonic acid, sulphuretted hydrogen, hydrocyanic acid, bisulphide of carbon, and ammonia.

These connections and valves, as shown in figs. 1 and 2, are as follows:—X is the general inlet-main, having a branch and a valve to each tank (leading into the passages G). Y is the general outlet-main, having a branch and valve to each tank. W is a main for working or bye-passing any of the tanks; the main having inlet branches and valves, outlet branches and valves, and bye-pass valves to each tank. T is the return main for conveying the gas from No. 6 tank at the top to No. 1 tank at the bottom. S is a pipe for conveying the gas from No. 5 tank to No. 2 tank. R is a pipe for conveying the gas from No. 1 to No. 5 tank. Q is the general bye-pass main, for bye-passing the whole of the tanks. P are the liquor overflow-pipes for conveying the purifying liquids from one chamber to another. The gas-inlet is shown by the arrows in the lower part of fig. 1. N is the tar-well. M is the apparatus for reciprocating the boxes B.

Gas Generating Burners.—Grube, E., of Hamburg. No. 17,264; Nov. 27, 1888. [6d.]

This invention relates to gas or vapour burners, in which the gas for feeding the burner is generated from a mineral oil or liquid hydrocarbon by the heat of the burner; and it consists in certain improvements in the construction of the burner whereby the interior of it may be easily accessible for cleaning. Coke and other solid obstructions are usually deposited within the pipes or retort of the burner during the process of burning; and these adhere to the sides of the pipes, &c., and impair the generation of gas from the oil, so that the interior of the burner is often clogged to such an extent as to need cleaning after several hours burning; but this is obviated in the burner now specified.

APPLICATIONS FOR LETTERS PATENT.

273.—Barkowski, R., "A new or improved gas-lamp and igniting device." Jan. 7.

277.—Woodard, J. E., "Improved clip attachment for fixing in gas-burners for increasing the light from same." Jan. 7.

296.—Houghton, A. B., "Improvements in or connected with atmospheric gas-burners." Jan. 8.

303.—Gebauer, O. H., "Improvements in or relating to volatile oil and gas burning lamps." Jan. 8.

322.—Key, W., "Improvements in and relating to gas-furnaces, applicable for smelting and other purposes." Jan. 8.

387.—Hall, J. D., "The 'Hall' gas-economizer." Jan. 9.

466.—Duke, J. F., Briggs, A. B., and Macpherson, R., "Automatically lighting gas." Jan. 10.

509.—Dempster, R. and J., "Improvements in apparatus for exhausting and forcing gas or other fluid." Jan. 11.

531.—Pierce, E., and Mirls, F., "Improvements in appliances for, and method of increasing the illuminating power of gas, oil, and similar lights." Jan. 11.

562.—Elster, S., "Improvements in automatic station gas governors." Jan. 11.

577.—Boutcher, A. G., "An improvement in spanners and gas-tongs." Jan. 12.

599.—Key, J. T., "The manufacture of gas from water for manufacturing, illuminating, and other purposes." Jan. 12.

661.—Thermann, W. P., "Improvements in motor engines, operated by the combustion of explosive mixtures of air and gas, or petroleum and other hydrocarbon." Jan. 14.

682.—Bennett, W. H., "Improvements in gasholder guiding apparatus." A communication from H. O'Connor. Jan. 14.

693.—Streeter, F. S., "Improvements in securing reflectors, smoke-shades, and other fittings to gas pendants." Jan. 14.

703.—Maxim, H. S., "Improvements in and relating to apparatus for carburetting gas." Jan. 14.

708.—Taylor, J., "An improved gas motor engine." Jan. 15.

710.—Dick, W. B., "Improvements in gas and oil stoves." Jan. 15.

712.—Jeffreys, J., "Improved method of making joints in cast-iron pipes." Jan. 15.

751.—Clark, G., and Todd, S., "Improvements in boilers and circulating cisterns for rapidly boiling water by the use of gas." Jan. 15.

768.—Spong, J. O., "An improved construction of gas carburetting apparatus." Jan. 15.

829.—Atkins, R., "An improved attachment for gas-burners." Jan. 16.

875.—Repland, E., "Improvements in gas-engines." A communication from P. Niel. Jan. 17.

912.—Merz, E., "Improvements in gas-cooking burners or stoves." Jan. 17.

927.—Creeke, R. W. B., "Improvements in guides for gasholders." Jan. 18.

991.—Meyer, H., "Improvements in fastenings of globe-holders." Jan. 19.

The Price of Gas Coke.—The price of gas coke has been increased by some of the gas companies in the north of England; and where contracts have been renewed for coke for cement works and allied industries, a higher price is now paid. Despite the large production of coke of late, stocks are limited, except at one or two of the Tees-side gas-works.

Correspondence.

[We are not responsible for the opinions expressed by Correspondents

THE PROPOSED NEW ASSOCIATION.

SIR,—All gas men must agree with the resolution stated in your last issue as having been adopted at a meeting of the late members of the Council—"That a National and Representative Organization is desirable for the Advancement of the Gas Industry." In the face of a competition growing keener every day, this necessity becomes more than ever paramount.

None can deny that the trade element has brought about the downfall of the present Institute. But to eliminate that trade element from it is impossible, since one trading member has obtained a perpetual injunction restraining the members from interfering in any way with his rights and privileges as a member; so that any attempt at a revisal of the rules in this needed direction would be at once stopped as a violation of the spirit of the injunction.

The time has come, therefore, when it behoves each one to determine which of the only two possible courses open he will adopt.—(1) To continue a member of the present Institute, where traders enjoy and must continue to enjoy, equally with himself, the privileges of membership; or (2) to lend his aid in the formation of a new organization, from which that baneful element is vigorously excluded—one which will be the means of welding together the real backbone of the gas industry, its hard working, though often underpaid engineers and managers.

Jan. 25, 1889. SPES.

THE GAS INSTITUTE.

SIR,—I read your "Essays, Commentaries, and Reviews," on page 153 of the JOURNAL this week, and am sorry to see such a bitter spirit displayed in the last twenty lines of the first article, towards the remaining Council of The Gas Institute. I have never seen in your paper before such bitter sneers against those gentlemen; and I cannot see why you should say such hurtful things against them, simply because they have thought fit to remain in office until June. I feel sure that no good end can be accomplished by it; it will neither do you, your paper, nor your friends any good.

I am sorry for the trouble we are mixed up with, and shall be heartily glad to see the end of such strife. I wish, with others, that none but men directly connected with gas-works were in the society. When managers and secretaries only were in it, we were better off; and if it were possible, I should be glad to see it reduced to these two classes of men again.

Now, Sir, what will the new society offer more than the old one has. The old one raised the subscription from 10s. 6d. to 21s. No doubt this was necessary to meet the growing expenses of management; but some of the working managers have an idea it was done to shut them out. One thing is sure, it did shut out some of the hardest working, and most industrious and deserving men. If the object of the society was to impart knowledge to the struggling manager who was anxious to improve himself, the 21s. was a barrier to him; and will this barrier still be allowed to remain, and will the new society introduce the same barrier? If so, it will be saying: "Be ye fed," and lifting no hand to help. I beg to say that, in my opinion, the yearly subscription wants altering into grades—that is, if our big brothers really do want to help their struggling brother managers. I would suggest that the subscriptions be as follows:—Let every manager whose works are producing less than 50 millions pay 10s.; over this, and under 200 millions, 20s.; over 200 and under 500 millions, 40s.; and over this, 60s. Any manager climbing higher would gladly pay the increased subscription. This, I think, would show the smaller manager that the society was trying to help him.

I consider the present subscription is a crying shame to the Institute. How any gentleman taking his £600 or £800 per year can stand by and see the hard-handed working man pay his 21s., equal to himself, I don't know. We should consider that there are 700 works of under 20 millions managed by some of the most practical men in the country, whose wages range from 14s. per week to 50s.; and many of these men have to work from twelve to sixteen hours a day, and have large families to maintain, and must keep themselves respectable. These men have to look twice at a shilling before parting with it; and to demand 21s. yearly from them is cruel, and ought to be altered. I feel sure if these men were to give their opinion upon this subject, they would one and all say 10s. is sufficient for them to pay in their present position; but they would willingly pay 20s., if they could but climb over the mark of 50s.

Cowes, Jan. 23, 1889. A. THOMAS.

INCREASED FACILITIES FOR GAS CONSUMPTION.

SIR,—Will you permit me, in response to the suggestion made by Mr. Valon a fortnight ago, to give my experience of efforts in the direction which he indicates.

Some 22 years ago, in conjunction with our Engineer, Mr. W. T. Carpenter, with the sanction of my Directors, I introduced the system of providing fittings complete, at a small quarterly rent. This rent was calculated at 10 per cent. per annum upon the selling price, equal to about 15 per cent. on the actual cost. I found it necessary to limit the selection to a few plain, serviceable patterns; but if, under exceptional circumstances, chandeliers or special fittings were supplied, an increased rent was charged. In ordinary cases 3d. per burner per quarter was the charge, with a minimum rent of 6d. per quarter. Two-light meters were charged 6d. per quarter; and larger in proportion. The system worked well, and brought a large increase of small consumers. It is important, we found, that the fittings supplied should be uniform—that is, of only one pattern of pendants, brackets, &c. If the option of selection is allowed, much difficulty will arise; and the stock of fittings for this purpose will become unprofitably large.

About ten years since we introduced the "three years' system" of hire and purchase. Under this, we gave the consumer full option of selecting any kind of fittings. These were charged at the ordinary marked selling prices; and the full value then divided into twelve equal quarterly payments. One of these payments I include with the quarter's gas bill, until all the twelve are paid. This system has been a great success, and has of late years almost superseded the ordinary hire system. The same system is also applied to the supply of cooking-stoves, or gas-fires, which are sold at a nominal profit, just to cover carriage, risk, &c. Our experience is that the "ordinary system" of supplying fittings on hire is found to be the more applicable amongst the occupiers of cottage property, who are, as a rule, "one-light consumers," using from 5000 to 8000 cubic feet in the year; but the "three years' system" may be made equally useful in houses of any size. Under the "ordinary system," we obtain, in all cases, the owner's or agent's signature to a form of consent to the removal of the fittings; and an acknowledgment that they are not liable to seizure under distraint for rent.

The recent introduction of improved oil-lamps does not, so far as we find, at all seriously affect the consumption of gas in private dwellings. The trouble of cleaning, re-wicking, and re-filling, with the cost of frequently-broken chimneys and globes, and the liability to disarrangement, are matters which are duly appreciated by careful people; and these tell immensely in favour of the alternative of using gas. The occasional unpleasant smell, and the risk of accident, are also disadvantages, which, advertisement statements notwithstanding, even the best oil-lamp makers have not successfully eliminated. The increased cost of really good quality oil is another contingency which tends to encourage the use of gas. Of course, something must be set down to the influence of "fashion," and to some extent the use of oil-lamps has become a "fad" with certain people who like to be different from their neighbours. All this is favoured by the absurdly impossible promises of economy and efficiency made by some advertising oil-lamp vendors. In tradesmen's shops and public-houses of the lower grade, these influences operate to some extent; but the experience of gas managers generally is, I think, that the consumers of this class who have reverted to the use of oil-lamps are, as a rule, persons of doubtful credit, or tradespeople whose businesses are falling off, and who are thus driven by circumstances to grasp at any possible means of economy. A few months' experience of Oil *v.* Gas usually convinces such tradespeople that they have been misled by the promises of the lamp sellers; but having purchased the lamps, they are compelled either to sacrifice the expenditure on their doubtful investment, or continue under difficulties to make the best of a bad bargain.

The question for those interested in promoting and extending the popular use of gas is one which, so far, has not, I think, received that careful attention which it really deserves. Gas has been, and still is, looked on by many persons as a *luxury;* it should be the aim of gas-sellers to render it an obvious *necessity* of life where it is obtainable. The old conservative notion that a gas company conferred a favour on the consumer by supplying him, was acted upon to a foolish extent by many companies. The sooner this idea gives place to a more business-like view of the gas trade, the better for all concerned. There is, in most towns, a large number of inhabitants who are profoundly ignorant of the economy, utility, and other advantages of the use of gas, even as an illuminant, to say nothing of its applicability for cooking and heating. The problem is, how best to convince this considerable section of the public that the use of gas in preference to oil will be a real gain to them in many ways.

In considering this problem, the gas purveyor has to divide these non-consumers into two distinct classes. The first, and most numerous, is the industrial section, depending on weekly wages. Gas has not yet been recognized as the proper "poor-man's light," although it is quite capable of being so rendered. These do not use gas because, in the first place, of the cost of laying on and providing burners. They can purchase for a few pence a more or less useful lamp; and with two pennyworth of oil, they are ready provided with facilities for light. They object to be called upon four times a year to pay a gas bill, even if it only amounts to a few shillings. They do not object to the weekly, or semi-weekly, expenditure in pence for oil, as that comes in as an ordinary item of housekeeping expenditure. The provision of plain, useful fittings in such cases may be dealt with satisfactorily by the system above referred to.

To meet the other objection against quarterly payments, several suggestions have been made. My own experience is that the plan of accepting weekly payments very imperfectly meets the requirements of such cases. In my district a simple plan of this kind, although well advertised, has not been at all generally accepted; it has not apparently just yet hit the popular taste. The "pre-payment meter" system, if found to be workable, offers the most promising solution. This, so far as I can learn, is, as yet, only in its tentative stage. Brownhill's patent appears to me not quite satisfactory; and the insertion of pence, singly or in number, is not likely, I fear, to become popular. The idea is good; but my present impression is that Price's patent (for a recent examination of which I am indebted to the courtesy of Messrs. Thomas Glover and Co.) has features of a much more promising kind. In this a shilling is used, and a prominent dial indicates how the shilling's-worth of gas is being consumed. I do not know that I am at liberty to say more about this invention, at present; but it certainly appears to promise well. One point, which Mr. John Glover mentioned to me in conversation, seems worth careful notice. Would it not be better to quote the price of gas at per 100 cubic feet, instead of at per 1000 feet? Three pence or four pence per 100 feet sounds, to the average consumer, far less formidable than 2s. 6d. or 3s. 4d. per 1000 feet. One hundred feet of gas at the higher rate of 4d. will at once strike the most casual calculator as the price of the quantity of gas which used in a 4-feet burner, will last twenty-five hours, or say, at the rate of six hours for one penny. The plainer, and more self-evident such facts can be made, the more readily they will arrest the notice of the general public. It is surprising the small amount of thinking out which the average member of that public cares to give to matters of this kind. Some of these remarks apply to the case of occupiers of larger houses as well as those of smaller ones. In larger houses I have found that the "three years' system" of supplying gas-fittings fixed complete, at the purchaser's selection, meets most of the difficulties, especially if the fittings are supplied at or under the "stores prices," which may well be done.

The subject is one which is well worth a thorough discussion in all its bearings. All I have attempted to do is to touch upon one or two of the points involved; and at present I shall only attempt to deal with

one other point. It should, I think, be recognized that the best customers of a gas company are those who consume just as much gas as they require, without waste. Consumers who habitually read their meters are always the best satisfied, and least troublesome. Those who flare away gas uselessly, and without thought of its cost, who put up with bad or extravagant burners, and who never think of checking their consumption by the meter register, are the very worst customers there are. Every now and then they get a big bill, and then make loud complaints, claim to have their meters tested, and complain to all their friends how grossly they have been overcharged. These persons do the gas trade a hundred-fold more injury than the slight profit on their excess and wasted consumption. It may safely be estimated that one such incident as this is often the means of preventing half-a-dozen persons from becoming gas-consumers from the natural dread of its excessive cost, as compared with that of oil.

By your permission, I may later on deal with some other features of this important question.

Sheppy Gas Company, Jan. 25, 1889. A. W. MARKS, *Secretary.*

THE ACTUATING OF STOKING MACHINERY BY MEANS OF ROPES.

SIR,—As the columns of your JOURNAL are always open to those engaged in our important industry, I deem it advisable, on behalf of my own interests, to take advantage of this privilege, and say a few words about Mr. West's letter, published in your last issue.

I was pleased to see that he, very properly, pointed out the difference between a stoking machine and the application to it of a motive power. I would also point out a difference existing between my own and his employment of the same power—an endless rope. Mine is of hemp, which I prefer; his, of wire. This difference scarcely justifies him in pronouncing so broad a judgment upon his own machine as in saying: "I believe that I am the first to have brought stoking machinery driven by these means to a complete and successful issue." This machinery was patented at the beginning of last year; mine in 1878. Shortly after mine was patented, it was shown at work to all the leading gas engineers and managers; and it was subsequently seen by Mr. West. Without any important alteration of the machine, it has continued at work ever since it was started. Further, as showing the confidence in it, I may mention that the machine has stood alone in the house without any duplication; and that the whole house has now been worked for some years. Fourteen beds of 18-inch retorts, eight in a bed, are now in action.

That Mr. West should have adopted this system, having tried several others, is a great satisfaction to me after my ten years' experience.

South Shields, Jan. 26, 1889. W. J. WARNER.

THE GAS ENGINEERING STAFF AT MANCHESTER.

SIR,—Being from Manchester, I did not until this morning see "Fairplay's" letter in your JOURNAL of the 15th inst.

Pray permit me to say, in justice to the Engineer of the Gaythorn Gas-Works (who is not personally known to me), that I should be sorry to disparage his abilities in any way; but it appears unaccountable to me that a man worthy of such a position could be found for £200, when the previous Engineer had £500. "Fairplay" has unwittingly made the subject more complex than ever, by informing us that this Engineer had been a designer of gasholders, and had done yeoman service for the Corporation.

Surely the Gas Committee know all about what has been done in the past, as they set a value upon past services, and appear to be alive to the necessity of encouraging their officials; for, as the *City News* stated a few weeks ago, the Gas Committee had this Engineer's salary under consideration, and finally recommended the Council of this great and important city that ("Oh! tell it not in Gath") they desired to increase this talented Engineer's salary from £200 to £210 per annum.

I wonder what "Fairplay" thinks of this. I conclude that he agrees with me in the opinion that they ought at least to have doubled his salary.

The serious and important aspect of the question to us ratepayers is, will this miserable and paltry treatment of officials tend to a speedy supply of purer and cheaper gas, like they are getting at other towns in the neighbourhood; or are we to be driven to the use of the electric light, which is now being so freely offered to us?

Manchester, Jan. 26, 1889. LUX.

ESTIMATING THE COMPARATIVE VALUE OF COAL.

SIR,—I am obliged to Mr. J. Ferguson Bell for his letter in your last issue. When I wrote previously, I had only a memorandum of the figures in question (having lent my copy of the "Handbook" to a friend), and had no recollection of the note to which Mr. Bell has drawn attention. Otherwise, I should not have trespassed on your space.

Mr. Bell seems to assume that I gave my figures as applicable to any case. I simply gave them as a practical example (so far as illuminating power and price of gas are concerned) of the gas undertaking with which I am connected.

The method of calculation by candle-feet is undoubtedly simple; but whether simpler or more useful for comparison than a standard of 20 candles, are points upon which, I think, there is room for a difference of opinion.

Stalybridge, Jan. 24, 1889. THOMAS M'DERMOTT.

PUBLIC LIGHTING BY OIL.*

SIR,—I have seen in the JOURNAL the letter from Mr. Keys, in which reference is made to the street lighting of this parish. Whether the lamps are of the kind referred to, is a question of fact which can be settled by any person interested making a personal inspection (say) at midnight, when the lamps have been alight about seven hours.

Mr. Key's reliability may be judged by the remark that the Local Board have recently "received tenders for electric lighting, and for gas also;" which is simply untrue.

As there is a saving effected in this parish of nearly £1000 per annum by the adoption of oil in lieu of gas, the ratepayers (who know the facts of the case) do not betray any great anxiety to revert to gas, in spite of the picture portrayed by your veracious correspondent.

Wimbledon, Jan. 23, 1889. W. SANTO CRIMP, Surveyor to the Local Board.

* Mr. Keys, whose letter on this subject appeared last week, writes to point out that he inadvertently used the words, "the *lamps* being fitted in the top of the lanterns," instead of "the *tanks* being fitted," &c. He says it is very awkward for a man to fill up these tanks when on the top of a ladder; and almost always the oil gets spilt over the lantern and column, as well as on the pavement—especially on the windy days, of which we have so many in England.

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

MONDAY, JAN. 21.

(*Before Justices* CAVE *and* A. L. SMITH.)

THE CONSETT WATER-WORKS COMPANY *v.* RITSON.

This case, which raised an important question to water companies in mining districts, was heard on May 9 last year; and at the conclusion of the arguments, their Lordships took time to consider their judgment. The matter came before the Court by way of a special case; each party having made admissions so as to have the question of law fairly determined. The case stated that the plaintiffs were, and are owners of land at Armfield, in the county of Durham, and claimed to be entitled to have the surface thereof supported by the mines and minerals underneath and adjacent to the same. The Company acquired the land, and constructed a reservoir, dwelling-house, and other buildings, under the powers of the Water-Works Clauses Act, 1847, and their Special Acts of 1860 and 1869. The defendant originally gave notice to the plaintiffs that he intended to work the coal in the Shield Row seam of coal mines, of which he was the lessee, under the land in question, within a distance of 40 yards from the plaintiffs' reservoir. But on March 10, 1880, defendant gave notice that he intended to work the coal in all and every the seams of coal mines of which he was lessee and occupier, under the land within 40 yards of the reservoir. The plaintiffs did not, within 30 days after the dates of the said notices, state their willingness to treat with the defendant. The Company contended that they were entitled to have the land supported by the mines and minerals underneath and adjacent to the same; that the mines should not be worked so as to destroy or damage the land or reservoir, whether such working was before or after 30 days from the date of the notices; that the defendant wrongfully worked out the said coal mines and minerals under the land adjacent to the reservoir, without leaving proper and sufficient support for the surface, whereby the land was cracked, swagged, and rendered uneven; and in the month of June, 1886, the reservoir began to leak, and the embankment and floor thereof were found to be cracked, and were no longer able to hold water. These cracks, continued, and became worse and more numerous, so that the reservoir became useless; and the cost of construction to the plaintiffs was lost. Plaintiffs claimed £15,000 damages; and an injunction to restrain defendant from continuing or repeating the acts complained of.

Sir HENRY JAMES, Q.C., and Mr. H. F. MANISTY appeared for the plaintiffs; the ATTORNEY-GENERAL (Sir R. E. Webster, Q.C.), Mr. RIGBY, Q.C., and Mr. DANCKWERTS for the defendant.

In delivering the judgment of the Court,

Justice SMITH said: This is an action brought by the plaintiffs against the defendant for having, by mining operations, let down the surface of the land upon which plaintiffs' reservoir stood; and they claim damages and an injunction. The material facts necessary for determining on the points now in question are as follows:—In and prior to the year 1773, the Lords Bishops of Durham were Lords of the Manor of Lanchester in the County Palatine of Durham; and as such were entitled in fee simple to the moors, commons, and waste land therein, and the mines and minerals thereunder, and to mine, win, work, and carry away the same, subject to certain rights of common of pasture to the commoners thereon appertaining. In that year—viz., 1773, an Act for the dividing and enclosing of the moors, commons, and waste land, and for allotting the same among allottees was passed; and pursuant thereto divers allotments were made to the different allottees therein designated. One of these allotments was made to George Clavering, the predecessor in title of John Clavering, as having a right of common upon the moors or commons appurtenant to his freehold. The plaintiffs were incorporated by the Consett Water-Works Act, 1860, which incorporates the Lands Clauses Consolidation Act, 1847, and obtained further powers under subsequent Acts. In the year 1876, the plaintiffs purchased compulsorily from John Clavering the site upon which their reservoir is built; being some of the land allotted to George Clavering as aforesaid. The defendant claims title, under the Lord Bishop of Durham, to work the mines and minerals under the plaintiffs' property. On Sept. 13, 1878, he had intended to work the coal under the plaintiffs' land within a distance of 40 yards from the reservoir; and the plaintiffs did not within 30 days thereof, or at all, state their willingness to treat with the defendant, whereupon he proceeded to work such coal according to the usual course and practice of mining, and did the damage complained of, and hence the present action. The first question which arises is this: Is the Bishop of Durham and consequently the defendant (for he has the same rights, no more and no less), entitled to win, in the ordinary and accustomed manner, the minerals lying under the lands allotted to the Claverings, so as to let down the surface. If, "Yes," the judgment must be for the defendant. If, however, the question be answered in the negative, then arises the further inquiry, Are the plaintiffs in the same position, and have they the same right of support, as the Claverings? It was argued on the defendant's behalf, that the Bishop had a perfect right to let down the Claverings, assuming, as is admitted, that the working was according to the usual course and practice of mining, and also that if this proposition was not established, yet the plaintiffs, on account of their having purchased the land compulsorily under the Lands Clauses Consolidation Act, 1845, by reason of the Water-Works Clauses Act, 1847, were not entitled to the support of the subjacent minerals, not having purchased the same. As to the first point, this depends entirely upon what is the true construction of the Inclosure Act of 1773. Is the Lord of the Manor under this Act entitled to work his mines to an extent which might lead to the utter destruction of the surface, subject to the limited compensation therein provided for the damage so done, as has been held by the House of Lords to be the true construction of the Inclosure Act then under discussion in the case of the *Duke of Buccleuch v. Wakefield;* or is he only entitled to work in such a way as not to let down the surface, as was held by the House of Lords fourteen years later under the Inclosure Act, then under discussion in the case of *Love v. Bell?* It is now settled and undisputed law that, where minerals are separated from the surface, the mineral-owner is not entitled

to let down the surface unless by the deed, instrument, or Act of Parliament, by which the minerals are severed from the surface. It appears the surface-owner has parted with his right of support; or, in other words, that the mineral-owner's right to obtain the minerals is limited to getting them in such a manner as not to occasion injury to the surface owner, which is the same thing. This was laid down by Lord Justice Baggallay in *Love v. Bell*, and also Lord Blackburn in *Davies v. Treherne*; and it was not disputed at the bar. It was said, however, on behalf of the defendant that the Inclosure Act of 1773 did give to the Lord Bishop of Durham the right to let down the surface; and compensation therein stipulated being paid for so doing. As was pointed out by Lord Selborne in *Love v. Bell*, the person who made such a claim had the burden of proof thrown upon him, and that he did not satisfy such burden by merely showing that there were words, however large, applicable to the right of working and privileges connected with it and compensation to be paid for working, and for the use of those privileges, which might receive full effect consistently with the right to support. No one denies that the Bishops of Durham had and have the right to work the mines and minerals under the land in question. The point is, Are they entitled to work them so as to let down the surface? Mr. Rigby for the defendant insisted that the reservation clause in the Act of 1773 of itself gives such right; and, if not of itself, that it certainly does so when coupled with the clause for compensation. He says besides the general rights given to the Bishops look at the absolute right given to them to work all quarries, to erect buildings, and so on. How can it be contended, says he, that whereas the Bishops may actully work all quarries and build whatever buildings they may desire, and thereby presumably destroy or utilize for their own purpose the surface, yet that they may not let it down—an insignificant matter, he observes, in comparison to actually taking away and using the surface by quarrying and perpetually occupying the surface by buildings. It seems to me that the answer given by Vice-Chancellor Malins in *Duke of Buccleuch v. Wakefield* is the very opposite to this argument. The Vice-Chancellor, I am aware, in that case was over-ruled in the House of Lords. He, however, as to this point, says: "There is a remarkable distinction between letting down the surface by mining operations—such may go under the whole of the land; whereas a quarry is usually of limited area. I cannot, therefore, consider the circumstances of the quarries being reserved as entitling the Duke of Buccleuch, if necessary by mining, to let down the whole surface of the land." In this remark, I entirely agree; and I apply the same to the point taken about the buildings. Mr. Rigby further says that the Inclosure Act of 1773 enacts that the Bishops are to enjoy all the mines and minerals as fully and freely as they might or could have had, held, used, or enjoyed the same in case the Act had not been made, and that without paying any damage, or making satisfaction for so doing. Here, he says, are the same powers reserved to the Bishops as they had before the passing of the Act; and at that date the Bishops could have worked the minerals and let down the surface—for such, in reality, would have done no harm to the commoner, who only had limited rights of pasture over the commons and wastes. To this I answer that a similar clause was to be found in the case of the *Duke of Buccleuch v. Wakefield*, Yet the Lord Chancellor and Lord Chelmsford in no way rely upon it as giving the Duke the right to let down; but on the contrary held that the Act had created a different right in the Lord of the Manor on the inclosures from that which he previously possessed in relation to the wastes, and that what that right was must be determined by the Act itself. Very ingenious arguments were addressed to us by the learned Counsel on either side as to whether the present act was more like the act in the case of *The Duke of Buccleuch v. Wakefield*, or the act in *Love v. Bell;* and various similarities and dissimilarities were pointed out, and insisted upon. It therefore becomes important to ascertain the real principle on which in the one case the House of Lords held that the Lord of the Manor could let down the surface upon paying compensation, and not in the other. It seems to me that the cardinal distinction between the one case and the other is that in the first-named one, as was stated by Lord Selborne, there was "an absolute and unqualified claim for compensation; so that, whatever might be the extent of the damage sustained, full reparation for the damage would be made to whoever might be the person who sustained it; whereas there was no equivalent clause in *Love v. Bell*." Lord Watson in the same case says: "The powers given in the case of the Duke of Buccleuch were made subject to the condition that those who worked the mines should make full compensation for all injury thereby occasioned to the owners of the surface." "I concur," says Lord Watson, in the opinion expressed by Lord Justice Mellish in *Hext v. Gill* that no one can read the judgment without coming to the conclusion that, if the provision as to compensation had not been there, the House of Lords, notwithstanding the strength of the other words, would in all probability have come to another conclusion." Lord Bramwell also laid stress upon the inadequacy of the compensation clause in *Love v. Bell* to compensate for the damage which it was asserted therein could lawfully be done by the Lord of the Manor. I am fully alive to the other differences pointed out by Lord Selborne between the acts in *Love v. Bell*, and in the Duke of Buccleuch's case; but it seems to me that the radical distinction between the two cases is that in the one there is an absolute unqualified clause for compensation; so whatever might be the extent of damage, full reparation would be made to the person sustaining it, whereas in the other there was not. What sort of compensation clause is there in the present case? Simply and solely this: In the first place the annual rental of 500 acres is set apart to provide for the compensation which the allottees might hereafter be entitled to. If and when that fails, then the deficiency is to be made up out of the pockets of the allotters by means of a rate levied upon themselves. What does this mean? I will test it. By the preamble to the Act of 1773, it is stated that the moors, commons, or tracts of waste land in their then state are of little use or service, but considerable parts thereof are capable of cultivation and improvement. This applies, I am told, to some 20,000 acres of land. The annual rent of 500 of these acres are to be set apart for paying in the first place the compensation payable. If I put 5s. per acre as the rental value, from what I gleaned during the argument, I have placed an ample rental value thereon. This makes a sum of £125 a year to compensate for what may be the damages done by letting down the whole of the allottees, as well as for the surface damage—that is, spoilage of ground admittedly compensated by the Act. Should such a letting-down occur, how is the deficiency to be made up; for that there must be a deficiency is obvious? Why out of the allottees' own funds. I have only to state the case in order to show how utterly inadequate is the compensation. It seems to me but poor compensation for the allottees, after having been let down by the Bishop, to be told that, for the major portion of the damage, they will have to bear the loss themselves. Is this full reparation for the damage done as in the Duke of Buccleuch's case? Certainly not. Moreover in that case the damage was to be paid for by the person doing it; in this case, after the rental of the 500 acres has been exhausted, the persons damnified *inter se* are to make good the same, nor at any time is the person causing the damage to make it good. Sir Henry James for the plaintiff made a remark which struck me. It was this. He said if this Act contemplated the right to let down, was it not remarkable that some such words as "subsidence," or "letting down," or the like, were not to be found in the Act? and, he added, or in any other of the Inclosure Acts of about a century ago. In my judgment, the Bishops have not established that the Inclosure Act of 1773 gave them the right to let down the surface of the Clavering's land; but, on the contrary, I hold that upon the true construction of the Act, they have no such right, and that the contention on their part fails. Consequently, if this action had been brought by John Clavering before he had sold his allotment, as he did, under compulsion, to the plaintiffs, this action, in my opinion, could have been maintained by him. Is the Water Company in a worse position when let down than the Claverings would have been? It is contended by the Company that this cannot be. It is said whatever John Clavering had to sell, the plaintiffs Company purchased; that John Clavering had the surface *plus* the right to support to sell, and the said right the plaintiffs purchased, and therefore are entitled to maintain the action. Had the Company purchased of John Clavering otherwise than by compulsion under the Lands Clauses Consolidation Act, 1845, or, in other words, if the purchase had been voluntary, and not pursuant to statutable powers, this proposition, in my judgment, would have been correct. Say the plaintiffs, Why then are we to be worse off than if we had not purchased by compulsion, and why is the defendant to be better off than they would otherwise have been? If I had purchased from the plaintiffs, I should have purchased all James Clavering's interest in the property—that is, the surface and right to support, and the defendant could not have worked the coal so as to let us down; and this is true. "Why then," it is asked, "is the defendant to be better off by being allowed now to work coal which he otherwise could not have been allowed to do; and where is the right to support gone to, if it is not in us the plaintiffs?" To this it is answered by the defendant, "It is too late to argue these points, because judicial authority has determined what is the position of a Company purchasing under the Lands Clauses Act, coupled with the conjoint operation of the Railway Clauses Act, 1847." It is said that the plaintiff Company, by reason of the Water-Works Clauses Act, 1847, when purchasing under the Lands Clauses Act by compulsion, is in an exactly similar position. It has now been held by the highest authority that, where a railway company compulsorily purchases from an owner, who, at the date of notice to treat, is owner both of the surface and the minerals thereunder, and the Company gives no notice to treat for the minerals, it purchases solely the surface, and obtains no right of support at all. This is settled law. Again, it seems to me to have been decided by the Court of Appeal that, where a Company compulsorily purchase of a person who has leased the minerals to a lessee (it may be for 1000 years), so that at the date of the notice to treat the lessee has the right to the minerals, and not the vendor, the Company purchase the surface only, and no right to support at all. This is what was decided by the Court of Appeal in *Pountney v. Clayton*. Sir Henry James, however, on the part of the plaintiffs, denied that this was so, when the surface and minerals were owned by different persons at the date of the notice to treat, and not merely under lease; for, said he, there was a reversion existing in the lessor in the Pountney case and expectant upon the determination of the lease, which did not exist in the present case. This is so; but does it make any real difference? In the Pountney case, the Master of the Rolls treats the lease as what it in reality was—viz., a sale by the lessor to the lessee of the minerals, if there be time to get them. Lord Justice Bowen also clearly deals with a case of the ownership of the surface, and the ownership of the minerals being severed at the date of the notice to treat. In my judgment, the Court of Appeal decided in that case that where a Railway Company, under compulsory power, only gives notice to treat for the surface, whether the surface owner and mineral owner is the same or are different persons at the time, all the Company take under such a notice to treat is the land without the minerals; and to use the words of the Master of the Rolls in the case referred to: "The only right conveyed to them by the conveyance under the statute is one that gives them a right to all the land, except the mines, subject to this, that the mines may be worked against them to the utmost extent, even so that it may let down the railway, provided they are worked in the usual manner of working in the district." In answer to Sir Henry James, when he asked, Where then, in the present case, has the right to support gone, if my clients have not got it? I say, exactly where it went to in the case of *Pountney v. Clayton*—that is, not to the plaintiffs. The defendant is still under obligation to support the Claverings; but they—*i.e.*, the Claverings—are not now in a position to demand it. In my judgment, what the Master of the Rolls and Lord Justice Bowen said and decided in Pountney's case concludes me in this; and although undoubtedly cogent suggestions, are about to be put forward by my Brother Cave in his judgment in this case as to why it should be otherwise, in my opinion I am bound by what has heretofore been stated and held, and, at any rate in this Court, it is too late, and I am not permitted even to attempt to decide otherwise. It was then urged on behalf of the plaintiff that they, being a water company, did not stand in the same position as a railway company might have done, though they equally purchased under the compulsory powers of the Lands Clauses Consolidation Act, 1845, by reason of the Water-Works Clauses Act, 1847, being in some degree different from the Railway Clauses Act, 1845. The sections in the Railway Clauses Act, 1845, which have been called a code of the rights of mine-owners within 40 yards of the railway, are 77, 78, and 79. The corresponding sections of the Water-Works Clauses Act, 1847, are 18, 22, 23. The sole distinction between the two sets of clauses is that, in section 23 of the Act of 1847 the words "as if this Act and the Special Act had not been passed," are inserted; and it is argued that these words were purposely inserted to prevent a mine-owner working his minerals (which, be it remembered, have never been purchased), in a manner different from that in which he would have been able to have worked them had a railway company compulsorily purchased the surface; or, in other words, that though in the case of a railway company purchasing compulsorily the surface, the mine-owner might let it down, in the case of a water company he could not. I cannot hold that this is so. The reasons applicable to the section in the Railway Clauses Consolidation Act, 1845, and forcibly given by the Master of the Rolls in *Pountney v. Clayton*, are in my judgment equally applicable to the case of a water company as to a railway. Why, I ask, is it to be assumed that inasmuch as a railway company not paying for the minerals may be let down, a water company, equally not paying for them, is to be supported? No good reason can be given. Moreover, as was pointed out by Mr. Rigby, the Water-Works Clauses Acts, 1847, was passed only two years after the Railway Clauses Act, 1845; and in the interval, no cases as to rights to support had come up for determination. In my opinion, the words have not the effect contended for; and as regards the right to support a railway company and a water company when they purchase compulsorily, they are both identically in the same position. My judgment therefore is that the Claverings had, and still have, the right to support from the Bishops of Durham, and the plaintiffs have not; that the action fails; and that judgment must be for the defendant, with costs.

Justice Cave: There are two questions in this case. The first turns on

the interpretation to be put on the Lanchester Common Act, and the other on the interpretation to be put on that part of the Water-Works Clauses Act which relates to mines lying under or near water-works. On the first question, I agree with my Brother Smith. We start with the admission that, before the passing of the Lanchester Common Act, the Lords of the Manor had no right to let down the surface of the common. It must, therefore, be made out to our satisfaction that the Act has given to the Lord a right which did not previously exist. One section (on page 58 of the Act), I think, in effect gives the Lord of the Manor power to work his mines, minerals, and quarries, as fully and freely as he would have had held, used, and enjoyed the same in case the Act had not been passed; and this without paying any damages or making satisfaction for so doing. It seems impossible from the language to infer that the Legislature intended to confer on the Lord of the Manor some rights which he had not got, especially as he is not to pay any damages, or make any satisfaction. Mr. Rigby relied on the words empowering the Lord of the Manor to make all convenient ways; and to remove fences, trees, or other obstructions. I think, however, that these words are merely intended to secure to the Lord of the Manor the same powers he had before, notwithstanding the altered conditions of the surface. Before the enclosure he would have made ways where he liked; and these words reserve to him the same right notwithstanding that, in consequence of the enclosure, fences might be put up, trees planted, or other obstructions erected by the allottees. So far as I am able to construe the language of the section, I can find no intention to confer on the Lord of the Manor any power which he did not possess before the passing of the Act. Mr. Rigby also placed great reliance on the clauses which give compensation to persons injured in the mines. Now, where the Act is ambiguous as to whether the Lord of the Manor is or is not to have new rights, the fact that he is bound to make full compensation to the surface-owner for all damage that may be done to the surface by the exercise of any of these rights, is a good reason for giving the Act a wide construction; for it is more for the public advantage that the minerals should be obtained when the surface-owner is fully compensated for the loss he has sustained by their being got, than that they should lie idle in the bowels of the earth, because the surface-owner capriciously refuses to permit their being worked. But where the Lord of the Manor reaps the benefit, and the compensation is partial only, or not paid out of his pocket, the reason for construing the language of the Act benevolently towards him is gone. In this case the effect of the compensation is such that all the benefits of letting down the surface would go into the pocket of the Lord of the Manor; and all the compensation would come out of the pockets of the surface-owners as a body, since it is only in his capacity as surface-owner of the lands that the Lord of the Manor will contribute to the compensation. So far from leading us to find a meaning which is not apparent in the clause I have referred to on p. 58, these compensation clauses ought to lead us to scrutinize very narrowly the powers conferred on the Lord of the Manor, as it is in itself highly improbable that the Legislature would confer on him a right he did not possess before, on the terms that the compensation to be made to surface-owners for damage sustained by the exercise of this new right should come not out of his pocket, to whom the right was granted, but of the general body of surface-owners at whose expense it was given. On the other hand, assume that no new right is given, but only the old rights confirmed and defined with reference to the change of circumstances arising from the enclosure; and everything then is plain sailing. These old rights had, previously to the enclosure, been exercised at the expense of the commoners generally, because their interests were joint, and not several. When, after the enclosure, their interests became several, the Lord of the Manor, in working the mines, might, in the exercise of his rights, inflict great damage on some particular surface-owner, and, under those circumstances, it was only reasonable that the Legislature should compel the general body of the owners, by a kind of mutual insurance, to form a fund for the relief of an individual sufferer at the joint expense of the whole body. With regard to the second point, after very much hesitation, and long consideration, I feel myself compelled to differ from my learned brother. Previous to June 10, 1876, John Clavering was the owner of the surface of the soil afterwards conveyed to the plaintiffs, and was, if I am right in the previous part of my judgment, entitled to have his land supported by the subjacent and adjacent land and minerals. Section 18 of the Water-Works Clauses Act, 1847, did not apply; for John Clavering had no interest in the minerals, and no conveyance from him would, under any circumstances, give the plaintiffs any right to the mines or minerals under the land belonging to him, nor even to such parts thereof (if any) as were necessary to be dug or carried away or used in the construction of the water-works. There was nothing, therefore, to preclude John Clavering from requiring to be compensated for the whole of his interest in the lands taken by the Company—that is, for the surface, with a right to support. The Lords of the Manor, on the other hand, were not the absolute owners of the minerals to do what they liked with them; but were bound not to remove them in such a way as to deprive the superjacent and adjacent surface of its support. Under these circumstances there is no express provision in the Act that the right of support which John Clavering then had should remain in him after his conveyance to the plaintiffs, or should upon the execution of that conveyance, cease to exist for the benefit of the Lords of the manor or the lessees. There is nothing in the Act to enable the former surface-owner to make any claim on the mineral-owners or their lessees, when they give notice to work the mine; and if the surface-owner is not entitled to be compensated for the whole of his interest in the land, including the right of support when the Water Company purchase, I do not see how he is to get compensation at all. Section 22 of the Act undoubtedly applies to such a case as the present; and if, on notice of intention to work the minerals being given, the Water Company determine to make compensation, on what basis is the compensation to be assessed? Is it to be assessed on the assumption that the mineral-owner can work his mines without leaving support for the surface, or on the assumption that he must leave such support? The difference may be very considerable. Thus, in the case of the *Great Western Railway Company v. Bennett*, it was declared by the award that if Bennett was entitled to work out the whole of certain minerals under the railway, the compensation would be £3649 10s.; but that, if he was bound to leave reasonable support to the surface, the compensation would only be £1085 3s. 8d. In such a case as that, why is the mineral-owner to get this enormous advantage at the expense either of the Water Company, if they have to compensate the surface-owner for his right of support, or of the surface-owner if he is not to get such compensation? Before June 10, 1876, the Lords of the Manor, or their lessee, were only entitled to such of the minerals as they could get without interfering with the support of John Clavering's land. Under what provision of the Act did they immediately on the execution of that conveyance, become entitled to work the whole of the minerals? Section 22 of the Act provides that the Company may, if they please, on receiving notice of the mine-owners intention to work the mines, elect to give compensation to the owner, lessee, or occupier, and then he shall not work the minerals That the compensation to be given must be limited to the nature and extent of the owner, occupier, or lessee's interest is established by *Smith v. Great Western Railway Company*. If, as is there laid down, the lessee of the minerals gives notice of his intention to work the mines, the Company are to come to an agreement or settlement with him, according to what his rights may be. If he has a tenure, the length of which will enable him to take away the minerals and exhaust them entirely, the Railway Company are bound to compensate him to an extent equal to the whole value of the minerals. If his right is not so great—if he cannot take away the whole, or if his tenure is not such as would enable him to take away the whole—the Company would have to compensate him to an extent less than the value of the whole; and if any other person has an interest in the minerals, he also will be entitled to compensation in proportion to that interest. Now, it seems to me that the interest which, under these clauses relating to mines, is to be the subject of future compensation, and is to be excepted out of the grant to the railway company or the water company, is an interest in the minerals themselves. It is only where there are minerals under the railway or water-works, in which the owner of the surface has an interest, that the railway or water company are to be entitled to purchase the surface, only reserving his interest in the minerals for future compensation. Where the ownership of the surface and of the minerals has been severed; and the owner of the surface has no interest in the minerals, but only a right of support, he is exactly in the same position as an owner of lands in which there are no minerals. In such a case the owner is entitled to receive compensation for the full value of his interest at the time of his purchase by the railway or water company, and not for the surface only, excluding the right of support; and it seems to me to follow that John Clavering at the time of the sale to the Water Company was entitled to, and presumably obtained, compensation for the whole of his interest—that is, for the surface *plus* the right of support; and I see no machinery in the Act giving John Clavering any right to come upon the Water Company, when the lessee gave notice to work the minerals under the water-works, and claim compensation for the right of support. It would be altogether anomalous that John Clavering should have reserved to him at the time of purchase by the Company such an interest as a right of support to the surface he was parting with, or that he should be at liberty to claim compensation for the loss of such a right when the lessee gave notice to work the minerals; seeing that if this right of support were reserved to Clavering, he would not lose it as a consequence of the notice given by the lessee, who could only work the minerals to the extent to which he was entitled to work them before the sale to the Water Company—that is, to such an extent as would not interfere with the right of support to the surface. I think that any other conclusion would either give the owner or lessee of the minerals a right greater than he had before the purchase by the Company, or would confer upon Clavering an interest in the minerals which he did not possess before he sold the surface. It is said however, that there is a decision of the Court of Appeal which concludes the point in favour of the defendants. That is the case of *Pountney v. Clayton;* and as that case is undoubtedly binding upon us, it is important to see what is really decided by it. In that case the railway company purchased the surface of the land from the owner, who was also the owner of the minerals beneath which he had previously demised; reserving to himself, however, a right of support for the surface which would necessarily prevent the lessees getting the whole of the minerals. The owner of the surface, therefore, had an interest in the minerals over and beyond the interests of the lessee, which, as I have shown from the award in the case of the *Great Western Railway Company v. Bennett*, might possibly very much exceed in value the interest of the lessee. This, therefore, was a case in which the railway company could not be compelled to purchase, and did not purchase, the whole interest of the owner, who, therefore, according to *Smith v. The Great Western Railway Company* was entitled to compensation from the company at some subsequent period for his interest in the mines. If the railway company had in *Pountney v. Clayton* constructed their line over the surface so purchased, and the lessee had given notice of his intention to work the mines, then, according to the decision in *Smith v. The Great Western Railway Company*, the lessee would have been entitled to compensation for his interest in the minerals, and the lessor or reversioner for his interest; and if such compensation were refused by the railway company they would have taken the minerals either singly and successively according to their respective rights, or by arrangement with one another at the same time. That is substantially all that was decided in that case; and I cannot find anything in the judgment of the Master of the Rolls which is inconsistent with the view I take of this case. There is, however, an *obiter dictum* by Lord Justice Bowen—that, even where the surface has previously been severed from the minerals, leaving the surface-owner with a right of support only, and no interest in the minerals themselves, section 79 of the Railway Clauses Act applies; and the Lord Justice further says, as a consequence of the application of this section, if the railway company refuse to compensate the owner of the minerals for his interest—that is, for the right to get the minerals, leaving support for the surface; for that is all the interest he has—he is entitled to get them without leaving such support. I am unable to understand the reasons by which that view is supported. Section 79 read by the light of *Smith v The Great Western Railway Company* gives the mineral-owner a right to compensation for his interest in the minerals, according to the nature of his interest, and if the Railway Company do not make the compensation, I do not see anything in the section giving the mineral-owner a larger right than he had before. Take the present case. Before the conveyance to the Water Company, the mineral-owner would only have worked his mines on the terms of leaving sufficient minerals to support the surface. According to *Smith v. The Great Western Railway Company*, on his giving notice to the Water Company, they might have prevented his working the minerals by giving him compensation on the footing of his only being able to take such part of the minerals as would not interfere with the support of the surface. If such compensation is refused why is the mineral-owner to be entitled to take away the whole of the minerals? The Lord Justice Bowen says that section 79 of the Railway Clauses Act applies to every owner or occupier of any mine within 40 yards of the railway, and that you must cut down and alter the words of the section, in order to deprive the owner of his liberty to work the mine. But it is not contended here that the owner is not at liberty to work the mine, leaving support for the surface, which was all that he could do before the purchase by the Water Company; and I can find nothing in section 79 giving the owner any greater right of working the mine than he had before. According to *Smith v. The Great Western Railway Company*, he is to be compensated according to his interest in the minerals. I cannot see why he is to be compensated on one principle, and, if compensation is refused, be permitted to work the mine on another principle; nor can I find any provision in the Act enabling the Water Company in this case to purchase the surface only from John Clavering without paying for the right of support. If they are bound to pay Clavering, to whom it belonged, for the right of support, why are they to be deprived of it in favour of the owner of the minerals? A provision enabling the Company to buy the surface from Clavering without the

right of support, supposing such a provision to exist in the Act of Parliament, would not, I think, entitle the mine-owner to take away the whole of the minerals. Suppose that the mine-owner gave notice of his intention to work the mines; and on the Water Company refusing to give compensation he worked and took away the whole of the minerals. What would be Clavering's position? The Act gives him no right of action in such a case against the mine-owner: and even if he were entitled to claim compensation against the Company, the result would be that the latter would have to pay compensation to Clavering for a right to support, of which the mine-owner had (rightfully, according the premises) already deprived them. On the other hand, I see no difficulty in my view of the construction of the Act. The Water Company, when they purchase, must buy the surface from Clavering, along with the right of support, just as they would have had to do if there had been no minerals beneath. The rights of the mine-owners will remain as they were before. If he gives notice to work the mines, he will either be entitled to compensation on the basis of his having to leave minerals sufficient to support the surface, which is what he had to do before the sale by Clavering to the Company, or, if compensation is refused, he will be entitled to work his mines just as far as, and no further than he could have done if Clavering had remained the owner of the surface. For these reasons, I think that the *obiter dictum* of Lord Justice Bowen cannot be supported to its full extent. It is admittedly contrary to the *obiter dictum* of Chief Justice Cockburn in *The Great Western Railway Company v. Fletcher;* and under these circumstances, I consider that I am at liberty to exercise my own judgment, which—it being admitted for the purposes of this argument, that the weight of the water in the reservoir did not cause or contribute the subsidence—is in favour of the plaintiffs.

The Court being divided, Justice Smith withdrew his judgment, so as to enable the case to be taken to the Court of Appeal; and consequently the judgment of the Court was given in favour of the plaintiffs.

TUESDAY, JAN. 22.

(*Before Mr. Baron* HUDDLESTON *and Mr. Justice* WILLS.)

BRISTOL WATER-WORKS COMPANY *v.* THE MAYOR, ETC., OF BRISTOL.

Judgment in this case was delivered this morning. The arguments of Counsel, when the case was before the Court on the previous Wednesday, were reported in last week's JOURNAL (p. 161).

Baron HUDDLESTON, after stating the circumstances under which the question arose, said it had been argued that, looking at the interpretation clause of the Water-Works Clauses Act, 1847, which was incorporated with the Act of the plaintiff Company, the quay in question was a street; and therefore, under the 105th section of that Act, they were entitled to be recouped any expenses they were put to in consequence of alterations in the levels or directions of the quay. He should have been disposed to think that the quay was not a street, highway, or public passage in the ordinary acceptation of the term. It came within the definition "public place;" and certainly the description of the place given in the special case, and also that given of it by the defendants in their lease to the Merchant Venturers in 1764, would go very far to show that this was a public place within the meaning of the Act. But his Brother Wills had made a suggestion, the force of which appeared to him so great that he could not resist it, though it was a point which would have not been raised in argument by the Counsel for the defendants. It was this, that the interpretation clause in the 1847 Act did not apply. This clause, the whole of which had not been read, said that the words therein referred to should have the meanings therein assigned, "unless there be something in the subject or context repugnant to such construction." Now, looking to the 105th section, there were some words there which had not been called to their attention, and which made all the difference. Those words were—that, where the commissioners or other public body (in this case the corporation) desired to alter the level, direction, or situation "of any street or road within the limits," and so on. But for the words "or road," no doubt it would have been necessary to look at the interpretation clause, and probably to have held that the quay in question was a "public place," and came within the section; but there would seem to be no object in putting in those words "or road" if the word "street" was to have the meaning indicated by the interpretation clause, because in that clause, a street was said to be a road. They had come to the conclusion that, when the legislature used the words "any street or road," they must have meant street or road in the ordinary interpretation of the word; and therefore the power to obtain the expenses incurred could only have reference to cases where those expenses had been incurred upon an ordinary street or road. This clearly was not such a street; and therefore judgment must be for the defendants.

Justice WILLS was of the same opinion. In construing an Act of Parliament, or any other document, the first thing to do was to look at the language used; and a study of the consequences which would follow was of very little value unless the language was ambiguous. It was true the interpretation clause said a street should include any public place; and they were inclined to think that this was a "public place" within the meaning of the clause; but they had to consider first whether the interpretation clause applied at all. Here, he thought, there was something which clearly pointed in a different direction; because, if the interpretation clause were meant to apply, the word "street" by itself would have been sufficient, as it would include a road. It seemed to him they were bound to suppose there was some reason for adopting the expression "or road," instead of leaving it out, which would have been the right course if the interpretation clause were meant to apply. It was on this reasoning, and this only, that his judgment was based. Of course, if such construction led to any palpable absurdity, or to anything so unreasonable that one could not suppose the Legislature really meant it, it would be good ground for seeing whether some other rule of interpretation should be adopted; but it seemed to him there was nothing in the Act which tended to make one construction more or less reasonable than the other. The Private Act was beyond all doubt the result of some agreement come to between the Corporation and the Water Company when going to Parliament to obtain powers to carry out their undertaking. They were opposed by the Corporation, looking after their own interests; and the result was that certain clauses were inserted, which were either the result of a compromise, or of a struggle before the Parliamentary Committee; and in either case they were the expression of that which the parties themselves, or the Legislature, thought a reasonable way of settling questions of conflicting interests between the two bodies. It appeared to him whether the Company agreed to it, or it had been forced upon them, it would be in itself perfectly reasonable, whichever view were taken of the meaning of the section. There was nothing, therefore, in the enactment itself to render it necessary to depart from the wholesome canon of construction which he had referred to, that all the words of the clause must have effect given to them. He agreed therefore with Baron Huddleston that judgment must be for the defendants, with costs.

Execution was stayed pending an appeal, if the plaintiffs should be advised to carry the case further.

GREENWICH POLICE COURT.—SATURDAY, JAN. 19.

(*Before Mr.* MARSHAM.)

GREENWICH VESTRY *v.* THE SOUTH METROPOLITAN GAS COMPANY.

A RATING CASE.

To-day the hearing of this case was resumed. A report of the proceedings when the matter was first before the Court was given in the JOURNAL for the 15th inst.

Mr. A. GLEN appeared for the Vestry; Mr. W. C. RYDE for the Company.

Mr. GLEN: This, Sir, is a summons in respect of the second instalment of rates made on April 10 last, and also for the first instalment of rates made on Oct. 9. The property in question is some additional buildings in connection with the gas-works which first came into rating through a provisional list made on Sept. 29, 1887, which list became absorbed in a supplemental list under the Valuation (Metropolis) Act, 1869, on June 5, 1888. On June 19 a further provisional list was made, in respect of additional alterations, increasing the rateable value of the property by £4000. The Act provides machinery by which any question arising on the provisional list can be settled by the proper tribunal—that is to say, the Special Sessions or Assessment Sessions which sit under the Act.

Mr. MARSHAM: There is a case which says there is no appeal on the provisional list.

Mr. GLEN: Then you must wait till it gets into the supplemental list. But in the meantime the ratepayer has to pay upon the provisional list; and if it is eventually found to have been too much, he gets it back again in due course.

Mr. RYDE: I do not think my friend appreciates the point I take.

Mr. MARSHAM: You say there is no appeal against the provisional list, and that I have power to deal with the case.

Mr. RYDE: I say there is no appeal on the question of value on the provisional list; and as long as the right hereditaments are stated in the provisional list, I am bound to accept the value put upon them by the parish, however absurd it is. But I say the parish must show that the right hereditament has got into the provisional list. Until they do that, the other rate stands.

Mr. MARSHAM: You contend that they have no right to rate anything but the alterations.

Mr. RYDE: If my friend will put the gentleman in the box who made the valuation, I think I shall show a mistake has been made.

Mr. MARSHAM: The question is whether I have any right to go into that, if alterations have been made, which I understand you to admit there have been. Can I go into the question of whether it is only alterations he has considered?

Mr. RYDE: I submit you can. Before the Act of 1869 was passed, you always had to prove occupation. We admit occupation; but it comes in under another list, and it has been rated twice over.

Mr. MARSHAM: Am I bound to assume, if there are alterations, that it is only those he has considered?

Mr. RYDE: No; all the cases which have been decided have been ones where you could make a list once a week. Under the Act, you can only make lists at stated periods; and I say you must show that the list applies to the right property. The section begins with an "if"—if alterations, then a provisional list. I say the valuer has applied his mind to the wrong alterations. There are other good objections to the validity of the list as it stands; but I wish to rely on the main point. I submit there is a clear case of injustice here.

Mr. MARSHAM: It is only a question of standing out of your money for some time.

Mr. RYDE: I say they will never be able to put the property into any list, because they have it already rated.

Mr. GLEN: It will be taken up by the next supplemental list.

Mr. RYDE: It has been taken up by one; and now the parish are going to take it up by another. In 1890 everything will be at large when the quinquennial list will be made, which comes into force in 1891.

Mr. GLEN: The supplemental list came into force a little while ago.

Mr. RYDE: It has been made; but it does not come into force until next April.

Mr. GLEN: When the next supplemental list is made, it has to gather up all the provisional lists which have been made during the year—that is to say, it will gather up this particular provisional list which has recently been made. Although a supplemental list has come into force in the meantime, it will gather it up. My friend will have his right of appeal; it will not be superseded in that way.

Mr. MARSHAM: The case of the *Fulham Assessment Committee v. Wells* only decides that they cannot appeal against a provisional list. It does not say they cannot appeal against a supplemental list. It will be put in the supplemental list next year.

Mr. GLEN: The supplemental list has to state all the alterations which have taken place in the course of the year. Suppose the property has been increased by additions at one time; diminished again; and then perhaps burnt down, so that there have been several alterations in the year, you will have several provisional lists dealing with the alterations as they occur. This will all appear in the supplemental list; and my friend, if he says it is wrong, appeal against the supplemental list, or, if it is found incorrect, the rates paid will be refunded.

Mr. MARSHAM: All he is kept out of is the interest.

Mr. GLEN: The difference between the rate value and the value which the overseers have thought fit to put in the list.

Mr. RYDE: I do not admit my friend's statement of the law, or the practice either. I never heard of the practice until he suggested it.

Mr. GLEN: I heard of it some time ago; and I had to find out how it would work. The first time it occurred to me, I admit I did not see how it was to work if the property had got into a provisional list, and then been burnt down. Except you can gather the provisional lists into the supplemental list, there is no provision under which the overseers could get any rates during the time it was not burnt down. Unless the Act did work out in this way, it was a very good reason for appealing against a provisional list. The Courts, however, have held that you cannot appeal against a provisional list; you must wait for the supplemental list. Therefore, it is clear there must be some remedy on both sides. The overseers are entitled to get the rates for the two months during which the property exists; and, on the other hand, the ratepayer must have some means by which he can obtain relief.

MR. MARSHAM: Cannot the Company appeal to Quarter Sessions?

MR. GLEN: They can appeal against a poor-rate on some grounds.

MR. MARSHAM: Can they appeal on the ground that they have been over-rated?

MR. GLEN: No.

MR. RYDE: I do not know under which Act they can appeal.

MR. MARSHAM: In the ordinary way, you can appeal against any poor-rate on the ground that you are rated too high.

MR. GLEN: You cannot do that in the Metropolis; you must go to the Assessment Sessions.

MR. RYDE: I do not admit that you can appeal against a rate.

MR. GLEN: There is the case of *Regina v. The Institution of Civil*

Engineers, where the question was whether they were not exempt from rating altogether.

MR. RYDE: I am told that was not a case of poor-rate at all; but a question of Queen's taxes.

MR. GLEN: I was in the case; and it went to the Queen's Bench, where it was argued by Mr. Meadows White. The Quarter Sessions said we ought to have gone under the Valuation Act; that there was no appeal to the Quarter Sessions.

MR. MARSHAM: Is that case reported?

MR. GLEN: It is in the 5th Q. B. Div., p. 48.

Mr. MARSHAM: If there was an appeal to the Quarter Sessions, I should hold that they were bound to go there; but there is no appeal.

Mr. GLEN: I submit that the proper course for them to adopt is to appeal to the Assessment Sessions.

Mr. MARSHAM: It is only postponing it till next year, when they will get their money back, if they are right.

Mr. GLEN: In the provisional list, the Gas Company are rated in respect of "further extension of retort-houses and additional works and buildings," and in the first provisional list it was for "jetty, land, part retort-houses." If there has been something which would satisfy the description appearing in the valuation list, then the question which the Company wish to raise is whether there has, in fact, been such further extension of retort-houses of the value of the difference between the two lists. If there is any jurisdiction on the part of the parish authorities for the Company in a supplemental list under that description "further extension of retort-houses and additional works and buildings," then I say the valuation list is conclusive.

Mr. MARSHAM: And that I cannot go behind it.

Mr. GLEN: Just so; and the Company must raise the question by going to the other tribunal. I think that is really the whole point. They admit there is something which would satisfy the description; and if this is so, you cannot inquire to what extent it satisfies it, or make any other inquiry into the nature of the extension.

Mr. RYDE: Why not?

Mr. GLEN: Because if there has been an alteration, the section applies which justifies the overseers in making a provisional list; and when they have made it, having jurisdiction—however wrongly they may have exercised it in making a provisional list, provided they have some jurisdiction to make it—then they have duly made it, the poor-rate is based upon it; and it is conclusive. Section 47 provides that if, in the course of the year, there are additions, a provisional list is to be made. The Company having admitted there had been some alteration, which was not incorrectly described as "further extension of retort-houses," the overseers had jurisdiction to make a provisional list; and I submit that you, Sir, cannot go behind it. This is shortly my point; and I do not think I can add anything further in explanation of it.

Mr. RYDE: If I may interpose, I should like to ask my friend for his authority for his two propositions—first, that you can appeal in the Metropolis against a poor-rate otherwise than to an Assessment Sessions.

Mr. GLEN: The authority is *Regina v. Institution of Civil Engineers*.

Mr. RYDE: You have cited a case in which you were engaged; but that is hardly an authority. I should like an authority where the point was raised.

Mr. GLEN: The point was argued at the Quarter Sessions; and a special case was stated, which was decided by the Court of Queen's Bench.

Mr. RYDE: There is another point on which I should like my friend to cite his authority. He says, if there is anything in the list which could, in fact, possibly satisfy the list, you cannot possibly go behind the list. I should like to ask for any case decided in the Metropolis under this Act which says you cannot put the parish to the proof that they have rated the right property. I defy him to cite a case in support of that proposition.

Mr. MARSHAM: Can you show me that I have power to go behind the list? If you say there have been no alterations, that is one thing; but you admit there have been alterations.

Mr. GLEN: I have only to show there was jurisdiction to make a provisional list: and that is admitted. Any mistake in working it out must be corrected elsewhere.

Mr. MARSHAM: That is my view.

Mr. RYDE: For the present, I will not go into the point that the rate is bad on the face of it, but will deal with the other points. It is urged against me that section 47 provides a remedy for over-rating; and it is suggested that the proper course is to make out in the supplemental list as many entries as there have been in the provisional list—that is to say, a list showing the value on June 19, and another list giving the value in October.

Mr. MARSHAM: When a supplemental list is made, and they are considering it, they consider all the provisional lists which have gone before.

Mr. GLEN: Quite so.

Mr. MARSHAM: You say they can make a provisional list once a week if they like; but in making the supplemental list, they consider all the provisional lists.

Mr. GLEN: Otherwise you would do the ratepayer out of his right of appeal.

Mr. RYDE: That is just what I contend has been done here. I think I rightly understood my friend to say that, when the supplemental list is made out next June, it will show an entry corresponding to the £9000; and that there is another list for £13,000, which will also be shown. Therefore, in the supplemental list, the Assessment Sessions will have to try what was the true value of the property as it stood on June 19, 1888, when the provisional list of £9000 was made; next, the further question, what was the value of the property as altered somewhere in October, when the list for £13,000 was made; and if between now and next June, another list is made, there will be the third question to try—what was the value then, and what is the true value on April 6 next. I say, without fear of contradiction, in all the appeals against supplemental lists, that has never yet been done. The Assessment Sessions have asked themselves one question, and one only: "Was the supplemental list correct at the time it was made?" and they have never gone into the question of value at the different periods when the provisional lists were made. It is not conclusive that the thing has never been done, and therefore cannot be done; but I say, as the Act has been in force for nearly 19 years, the point must have arisen some time or other, if it is true.

Mr. MARSHAM: Has it ever been held that a Magistrate has power to go behind the valuation, as you are asking me to do now.

Mr. RYDE: I do not ask you to go behind it. I say, on the face of the list, they are out of Court.

Mr. MARSHAM: On the face of the list, there might have been any number of retort-houses built.

Mr. RYDE: I ask you to apply the same strict rule as if you were trying a case under the Statute of Frauds, where property has to be sold, or the construction of a will. You must go behind the list in the sense that you must apply the list to the fact. If a man leaves by will "my house in Belgrave Square," you must go behind the will to find out which was the house. The parish authorities say: "We rate you for further extensions and works." I say: "I am content with the value; but prove the further extensions and works." If they apply the Act properly to the facts, they have actually rated, at £4000 a year annual value, property which has cost in capital value under £2000; and therefore I say, when you see such a monstrous injustice being done, a strong *primâ facie* case is made out for putting the parish to the proof of showing they have applied their minds to the right hereditaments. If they will put the gentleman in the box who made the list, or will give any satisfactory proof at all that the right property has been valued, then I will sit down, and admit you cannot deal with the case.

Mr. GLEN: It is not disputed that the Gas Company are in occupation of the gas-works as a complete hereditament. The gas-works have been put into a supplemental list in consequence of additions which have been made to them, and if there has been an addition made to the old hereditament, which satisfies the condition in the list, I say you cannot inquire whether they have put a correct value on to the right part of the hereditament.

Mr. MARSHAM: You do not call the Surveyor.

Mr. GLEN: No, Sir.

Mr. RYDE: I can prove that the Surveyor did not understand the section of the Act, and did not know what he ought to value—that he, in fact, valued the same property twice over, and the capital value of the alteration is one-half of the annual value. Those are the facts I propose to prove.

Mr. GLEN: I shall contend that this is all inadmissible.

Mr. RYDE: I say my friend must connect the list with the hereditament in some sort of way. If a man is summoned to show cause why a distress warrant should not issue, you have to prove that you have brought the right man, and that he is in occupation of the property.

Mr. MARSHAM: That is proved here, or admitted.

Mr. RYDE: No; I do not admit that the property is rightly rated.

Mr. MARSHAM: You admit that the Company occupy these premises.

Mr. RYDE: Yes.

Mr. MARSHAM: And that they are rated for them.

Mr. RYDE: Yes.

Mr. MARSHAM: And that alterations have been made.

Mr. RYDE: Yes.

Mr. MARSHAM: And that the alterations should be taken into consideration; but you go further, and say that they have taken other things into consideration. My view is this: If you admit that alterations have been made during the time within which they have power to make the provisional list, then I have no power to go behind it. They would be bound to prove alterations if you did not admit them.

Mr. RYDE: I do not wish to take points which are not tenable. My friend says the entry in the valuation list is satisfied by the hereditament. I say: "Very well I will not go behind the valuation list. Take the first list; that is also satisfied by the present state of things." It is said the description of the properties in the list is satisfied by the facts; very well, the first list is also satisfied by the facts. They rely on one list; I rely on the other. If they say I cannot go behind one list, I say they cannot go behind the other. As one list contradicts the other, they must show which one is right. The Act provides that when once the list is made, it shall be conclusive of value. The supplemental list of June will fix the value of the property on April 6 last.

Mr. GLEN: It does not effect these rates.

Mr. RYDE: Yes; the valuation list made last June takes the value of the property as it stood on April 6. [The learned Counsel here quoted the various sections of the Act in support of his contention.] He continued: Even if the parish could show that the property had been omitted last year, they could not bring it in under section 47, unless the alteration had taken place during the year; for all the provisions depended upon the opening words "if there has been an alteration." Supposing a man put a chimney-pot on his house which prevented the drawing-room chimney from smoking, this would be an addition, but could it be contended, if the parish increased the rate by £500, that because the man when summoned admitted the alteration that the distress warrant would issue as a matter of course? This, no doubt, was an absurd illustration, but it was really what had taken place in the present case. Another objection to the list was this—that the "extent" of the property was omitted. If the extent had been stated, the mistake would have been apparent on the face of the list; and the Vestry would have been out of Court. Even if they will now say what they have valued, I will fight it, without the additions being stated. The next objection I take is, that they have also omitted from the list the "number of the class." There is nothing in the lists to enable the Court to identify the property; and I submit it is perfectly consistent with the facts that they have rated the property twice over. My friend does not dispute the accuracy of my copy of the list. As he claims to substitute the second provisional list for the first year, I say there is nothing to show that the same property is not in both lists, and that they have revalued the property over again.

Mr. MARSHAM: What do you say to that point, Mr. Glen?

Mr. GLEN: There is nothing in the point. My friend's mistake arises from this: Section 47 enacts that, if the value of any hereditament is increased, the overseers are to make a provisional list, as so increased or reduced, of such hereditament—that is the original hereditament. The class is not affected by the provisional list; it is in the quinquennial list and the supplemental list.

Mr. RYDE: No, that is not so. This is the first entry that has ever been made. These are new works; and there is nothing to indicate the extent of the property. The supplemental list repeats the same mistake.

Mr. GLEN: I was under a misapprehension. I thought these were existing gas-works, and that there had been alterations. As regards the provisional list in question, the claim for the "extent" is a claim put in for the valuation of land. When you are valuing a field, you put in the acreage; but in valuing works of this kind, the "extent" is not material, and, even if it were, it is an objection which can be dealt with by the Assessment Sessions—it does not affect the validity of the rate. Here you have a provisional list, which admittedly includes an alteration made in the value of the hereditament; and you look at the list, not for the purpose of seeing whether all the details are in it, but whether the overseers have taken the right value of it. If the Company say we have put the wrong extent or class, I say those are matters which you have no jurisdiction to deal with.

Mr. MARSHAM: You say it is material so far as the appeal goes; but that it is not material here.

Mr. GLEN: Quite so. It would be a ground of appeal on which they can go to the Assessment Sessions.

Mr MARSHAM: You say the list is a good one.

Mr. GLEN: There is nothing in the Act which says that the list shall be invalid if it does not contain every particular. The Act is not absolutely void and illegal because a mistake has been made in carrying in out. On this point, I submit that this is merely a directory provision; and, if it is material, it must be set right in the usual way.

Mr. RYDE: I think my friend has admitted he is out of Court, because he says the claim relating to "extent" is only important when there is land. Here we are rated in respect of "jetty, land, and part retort-

houses;" and as he admits it became important, I say it is most material to show that they have rated the right property.

Mr. GLEN: In the old provisional list, "land" is mentioned.

Mr. RYDE: And in the supplemental list——

Mr. MARSHAM: That is not the list the Vestry are going on.

Mr. RYDE: Until they displace that list, they must go upon it, as it is final until another one is made. There is nothing to indicate how much property is included therein; and until my friend gets it perfectly clear on the face of the list that the property rated is not included in the old list, he is bound by the latter. When he says that this is merely a "directory" section, and that any departure from it may be amended, or is immaterial, let me call his attention to the section which provides for dealing with clerical errors. Section 71 provides that any person who feels aggrieved by any error in the rate may apply to two Justices of the Peace or Magistrates, who may amend. This gives an easy mode of correcting clerical errors in the rate; but it gives no means of putting right a mistake in the list.

Mr. MARSHAM: I have no power to amend it.

Mr. RYDE: That shows that the people who drew the Act had not forgotten the danger of making omissions *per incuriam*.

Mr. MARSHAM: This is "in the rate."

Mr. RYDE: That proves my point, because they foresaw the danger of omissions; and they provided a means of correcting it in the rate, but there are no means of correcting it in the list. Section 45 says the list shall be conclusive evidence of the hereditaments being included therein. Although, in form, this is a technical objection, it really goes to the merits of the case.

Mr. GLEN: The Assessment Sessions may confirm or alter the valuation list so far as it is questioned by the appeal, so that there is a provision for amending anything of this kind. That is section 34.

Mr. RYDE: I agree it provides the means of correcting the list; but it has to be done on appeal; and the Fulham case has decided that there is no appeal against the list.

Mr. MARSHAM: This is very technical.

Mr. RYDE: It is; but it really goes to the merits of the case. I submit that I have a strong *bonâ fide* case; and the Company are merely resisting because they feel they are being unfairly dealt with. There are other reasons, on the merits of the case, why we should not accept this list.

Mr. MARSHAM: I suppose neither side will be satisfied with my decision. I shall either be asked to state a case, or there will be an application for a mandamus.

Mr. RYDE: If you are prepared to state a case, will you *pro formâ* refuse to issue the distress warrant, and leave my friend to apply for a mandamus.

Mr. MARSHAM: I think I am bound to decide according to my opinion.

Some discussion here ensued as to whether the Magistrate had power to state a case.

Mr. RYDE: Will my friend undertake not to take the objection that it is a wrong course to adopt.

Mr. GLEN: Certainly; I shall not object that a special case does not lie. I believe it does; for I have one case now awaiting the decision of the Court.

Mr. MARSHAM: I believe there is an authority showing that we have power to state a case. I am quite willing to grant a case. On the main point I am against the Company, though I think there may be something in the technical point. It being admitted that there have been alterations, I think I must assume that the fresh valuation has been made upon those alterations. I have no doubt about it.

Mr. RYDE: In order that there may be no doubt about it, I tender evidence to show what alterations have been made.

Mr. MARSHAM: I must refuse to hear the evidence. You have admitted that alterations have been made during the time.

Mr. GLEN: The order will be that a distress warrant issues.

Mr. MARSHAM: Yes; but if desired, I will adjourn the matter so as to allow the Company time to consider whether they will ask for a case.

Mr. GLEN: My friend has seven days in which to claim a case.

Mr. RYDE: We have given my friend's clients a fortnight's indulgence; they might allow us the same time.

Mr. MARSHAM: I will give you a fortnight. I will not formulate any decision to-day.

Mr. RYDE: We wish to consider our position. What do you do about costs, Sir? I suggest that there should be no costs, as the Vestry did not choose to be represented before you on the previous occasion, although they knew the Company were to be.

Mr. MARSHAM: I suppose the Parish will not ask for costs. I think as they were not represented the other day, they ought not to.

Mr. GLEN: I will not ask for costs.

Mr. MARSHAM: I adjourn the case formally for a fortnight, in order that the Company may consider whether they will ask for a case. If they do not, then the distress warrant will issue within seven days after the fortnight has expired.

IMPROVED STREET LIGHTING AT SOUTHAMPTON.—The Corporation of Southampton are having experiments made, under the superintendence of Mr. S. W. Durkin, the Manager of the Gas Company, with a view to improving the lighting of the streets. A number of Sugg's combination burners have been fixed with an arrangement by which the supply of gas may be confined to one burner when the principal street traffic has ceased. The lighting of the public thoroughfares has long been a subject of great complaint. The ratepayers, of course, know that better things are possible, because they cannot have forgotten the brilliant street lighting which the Gas Company so generously provided during the visit of the British Association to Southampton; and, therefore, an improvement is only a question of cost. If the system now being tried as an experiment can be brought into operation at a slight increase of expense, it is not anticipated that any objection will be raised, in view of the enormous advantage to be gained.

A DISPUTE RESPECTING SULPHATE OF AMMONIA.—On Tuesday last, at the Oldham County Court, before his Honour Judge Hutton, an action was brought by the Mayor, Aldermen, and Burgesses of the borough of Middleton against Joseph Horrocks, manufacturer of liquid ammonia, of Chadderton, to recover £4 4s., the value of sulphate of ammonia supplied. Mr. W. R. Clark appeared for the plaintiffs. Defendant acknowledged that he owed £2 6s.; but as to the balance—£1 18s.—he said it was in respect of sulphate of ammonia which was not of the quality ordered. The sulphate, for which the £1 18s. was charged, contained rubbish; and it cost him £10 to get his plant right after he had put the sulphate into it. Mr. C. L. Hartley, the Manager of the Middleton Gas-Works, at which the sulphate was made, said the sulphate in dispute was not sold as of the best quality. Defendant obtained it for a price under that charged for the best quality. His Honour came to the conclusion that the sulphate was not warranted; and he gave a verdict for the amount claimed, with costs.

Miscellaneous News.

THE GASLIGHT AND COKE COMPANY.

The following reports, with the accounts, showing the working of this Company during the six months ending Dec. 31 last, will be submitted to the proprietors at the ordinary half-yearly meeting, on the 6th prox.:—

Report of the Directors.

The accounts for the half year ending the 31st of December, 1888, herewith submitted, show that, after making provision for all charges, including interest and preferential dividends, there will remain a balance of £660,161 13s. 8d., out of which the Directors recommend a dividend at the rate of 13 per cent. on the ordinary stock. This dividend will absorb the sum of £355,459, and leave £304,702 13s. 8d. to be carried to the credit of the account of the current half year.

The reduction in the price of gas of 3d. per 1000 cubic feet (from 3s. to 2s. 9d.), made by the Directors on the 1st of January, 1888, represented a saving to the consumers of about £200,000 per annum; and, had there been no improvement in the business of the Company, would have reduced the profit to that extent. But the moderate increase of 3 per cent. per annum in the gas-rental, coupled with the increased price obtained for residuals, has enabled the Company, notwithstanding the reduction in the price of gas and the payment of the increased dividend, to carry over a somewhat larger balance than that with which they began the year.

The Directors, looking to the present state of the Company's business, to the amount carried forward, and to the almost certain lapse of the payment for coal dues, have made a further reduction of 3d. per 1000 cubic feet in the price of gas—viz., from 2s. 9d. to 2s. 6d.—taking effect from the 1st of January, 1889.

The Directors have full confidence that, while making this reduction, they will be able to pay the increased dividend of ¾ per cent. provided for by the sliding-scale clauses of the Act of 1876.

The Directors have reason to feel satisfied that a considerable increase in the sale of gas used as fuel for cooking, heating, and motive power has taken place.

The improved state of trade, the better prices of residuals, and the constant discoveries of more economical methods of manufacturing gas, appear to point to steady progress in the business of the Company.

The appeal in the case against the South Metropolitan Gas Company is still pending; and it is expected to come on for hearing before the House of Lords at an early date.

WILLIAM THOMAS MAKINS,
Governor.

Horseferry Road, Westminster, S.W.,
Jan. 17, 1889.

Construction and Carbonizing Department.

I beg to certify that the whole of the Company's gas manufacturing and storeage stations have been kept in good order and efficiency during the past six months.

I have further to report that, in order to meet the anticipated maximum day's increase during the present winter, the last of the twelve retort-houses at Beckton has been fitted up, together with all the apparatus in connection therewith. This completes the manufacturing power at that station as far as at present arranged.

A large gasholder tank has been constructed at the Bethnal Green station of the Company, to accommodate a gasholder to contain four million cubic feet. The gasholder is being manufactured, and is expected to be ready for use in time for the winter of 1889-90.

G. C. TREWBY,
Constructing and Carbonizing Engineer-in-Chief.

Distribution Department.

I hereby certify that the whole of the distributing plant under my charge has been maintained in a thorough state of repair and efficiency during the past half year.

ROBERT HARRIS,
Distributing Engineer.

Products Department.

I hereby certify that the whole of the plant, engines, boilers, stills, trucks, machinery, and tools in connection with the Company's products works under my charge have, during the past half year, been maintained in good working order and repair.

THOS. WILTON,
Superintendent of Products Works.

Appended to the report is the statement of accounts therein referred to. These will be given next week.

FAILURE OF THE GAS SUPPLY AT GLOSSOP.

Last Saturday evening, a great deal of inconvenience was caused to the tradesmen in High Street West, Glossop, by the gas suddenly going out, leaving the street in total darkness. This lasted some time; but at last appeared to be remedied, and the gas was again lit. In a short time, however, the lights once more dwindled; and in a minute or two, the principal street was a second time in darkness, and so remained for nearly two hours. "For a considerable period," says a local paper, "general dissatisfaction has been expressed at the inferior quality of the gas, especially considering the enormous price charged (4s. 2d. per 1000 cubic feet, subject to a discount of 5d. per 1000 feet for prompt payment). Several of the most important tradesmen have, in consequence, discontinued the use of gas, preferring the slight inconvenience attending the use of patent oil-lamps; and these enterprising individuals had their reward on Saturday night, for while their gas-using competitors had their places of business in total darkness, the oil-users had their shops brilliantly illuminated."

Writing on Sunday evening, Mr. J. Dalgliesh, the Engineer and Manager of the Gas Company, gives us the following particulars regarding the failure of the supply:—"Yesterday," he says, "I had an unpleasant experience; and it will be as well for me to furnish exact details. About 11 a.m., I found there was a stoppage of one of the purifiers; so I at once put on a good gang of men to fill the next vessel (which was not done before Sunday), and charged it, in the hope that I should overcome the difficulty. As soon as this was accomplished, the station meter commenced passing the gas; and I and the men felt satisfied all would go right. With the stock in the holders, and our ordinary make going in the right direction, there was more than sufficient for the day and night consumption; but to my annoyance, at 7.0 p.m. my difficulty commenced. All the gas made found its way at the outlet of the vessel standing off; and at 8.0 p.m. my stock became exhausted, and the town was put in darkness. Myself and men did our utmost, but could not raise the holder a rivet until midnight, when I let the gas pass through all four purifiers. I was then troubled with the centre valve, which is a very old one of the hydraulic type, and is constantly losing its seal. I have water running

in continuously, and have to keep a man to see that the water supply is kept up to keep the seal. It cannot be touched for a month or two, unless we stop gas making to renew the valve; and you can well imagine the awkwardness of our position. Fortunately my Chairman came to see me when the accident happened in the morning, and knows the whole trouble from beginning to end. There is only one permanent remedy, as soon as the season is favourable—that of providing new purifiers; the present being almost worn out. My opinion is that a hole is eaten in the valve shell, which allows unpurified gas to pass to vessel standing off."

THE BOARD OF TRADE RETURNS RELATING TO AUTHORIZED GAS UNDERTAKINGS.

In the JOURNAL for the 15th inst., some particulars were given from the then recently-issued returns relating to gas undertakings in the hands of Companies and Local Authorities throughout the United Kingdom. The following additional particulars respecting the returns are extracted from a "Memorandum" which has been prepared upon the subject by the Railway Department of the Board of Trade:—

"Compared with the returns for the previous year there has been an increase of £1,219,925 in the amount authorized; an increase of £1,115,113 in the amount paid up; an increase of 305,100 tons of coal carbonized; an increase of 3,439,976,765 cubic feet of gas made; an increase of 2,978,219,892 cubic feet of gas sold; an increase of 669½ miles of mains; an increase of 22,881 consumers; and an increase of 9659 public lamps lighted.

"The following will show some comparisons between the Companies' and Local Authorities' returns:—

——	Companies.	Local Authorities.
1. Proportion per undertaking of capital paid up	£97,386	£119,532
2. Proportion of paid-up capital per ton of coal carbonized	6 5 1	6 14 6
3. Expenditure per ton of coal carbonized	1 3 10	1 1 2
4. Profit per cent. on the paid-up capital (share and loan) based on difference between receipts and expenditure	8 16 0	6 12 9
5. Number of consumers per mile of main	85	153
6. Average consumption of gas per annum per consumer . . . . . Cubic feet	44,998	24,830
7. Average consumption of gas per public lamp . . . . . Cubic feet	16,635	14,508
8. Number of public lamps per mile of main	19	24
9. Number of undertakings	384	168
10. Number of undertakings which failed to make a profit	5	41

"A comparison of the Companies' and Local Authorities' returns also shows that the paid-up capital of the former is 37 millions, as compared with 20 millions of the Local Authorities; while the tons of coal carbonized, cubic feet of gas made and sold by the Companies, was double that of the Local Authorities—the balance in favour of the Companies, as will be seen above, being 9s. 5d. less capital employed for each ton of coal carbonized. Taking the number of consumers per mile of main, the comparison is still more favourable to the Companies, as it shows that the area supplied by them is more scattered than the area supplied by the Local Authorities. As regards the profit per cent. on the paid-up capital (share and loan), the comparison shows that the Companies earned a profit on the paid-up share and loan capital of £8 16s. against £6 12s. 9d. per cent. earned by the Local Authorities. This comparison, however, is hardly fair for the Local Authorities, as many of the Scotch undertakings are prohibited from making a profit, and consequently only charge sufficient to meet all necessary expenses. For this reason it is impossible to make a comparison of any value between the receipts of the two classes of undertakings. A comparison, however, between the expenditure per ton of coal carbonized shows that the Companies spent 2s. 8d. per ton more than the Local Authorities. Of the 384 undertakings belonging to Companies, 5 failed to make a profit; and of the 168 undertakings belonging to Local Authorities, no less than 41 did not make any profit.

"*Companies' Return.*—Of the £31,556,788 share capital paid up, £4,827,749, including premiums, has been raised under the auction clauses. Eighteen Companies paid no dividend on their share capital; 144 paid less than the authorized maximum dividends; 177 paid the authorized maximum dividends, in nearly all cases 10 and 7 per cent. respectively, on the original and additional capital; and 45 Companies, nearly all under the operation of the sliding scale, paid from 10½ to 16½ per cent. The lowest price charged for gas was 1s. 9d. per 1000 cubic feet at Plymouth, which earned a dividend of 12½ per cent.; and the highest price charged was 7s. 6d. at Walton-on-the-Naze, which did not earn any dividend.

"*Local Authorities.*—The lowest price charged for gas was 1s. 10d., discount 2½ and 5 per cent., at Leeds; but the charge was too low, as it resulted in a loss on the year's working of £9723—the paid-up capital (amount borrowed) being just over £1,000,000. The highest price charged for gas was 6s. 3d. at Bethesda and at Dunbar. The largest profits made were: Manchester, £49,786 applied for the purpose of lighting and making improvements to the city; Salford, £38,536, of which £20,895 was applied to the relief of rates; Birmingham, £25,773, applied to the borough improvement rate; Nottingham, £24,159, which had not been applied to any purpose at the date the return was made; and Belfast, £24,000, applied for extension of plant.

"The publication of the returns has been delayed as in former years in consequence of the dilatoriness of some of the Companies and Local Authorities in sending in returns."

INCREASED FACILITIES FOR GAS CONSUMPTION.

MR. VALON'S PROPOSALS.

A weekly financial paper (without making any mention of the JOURNAL in connection with the matter) comments as follows on the letter from Mr. W. A. Valon, which appeared in our columns of the 15th inst.:—

"We know that he who makes two blades of grass grow where only one grew before is a benefactor of mankind. In like manner anyone who can largely increase the consumption of gas deserves well of all gas proprietors. Mr. William A. Valon, of the Ramsgate Gas-Works, has put forward a scheme with this object. He is rightly of opinion that the greatest drawbacks to increased consumption are the first cost for fittings, and the deposit at present demanded from intending consumers. Unquestionably such is the case. But when we come to look a little closer into Mr. Valon's proposals, we are forced to the reflection that Ramsgate, in the matter of its gas supply, cannot be taken as a fair guide; and that if Mr. Valon's experience is limited to that town, he cannot be accepted as an authority. His proposition is as follows:—(1) Fit up any house with iron pipes free of cost for persons desiring a supply. (2) Supply gas-fittings to those persons at (say) an annual rental equal to 10 per cent. of their cost; these fittings to consist wholly of brackets or side-lights, and not to include gasaliers or fittings of a more expensive type. (3) Instead of demanding a deposit from those having a supply in this way, to give them the alternative of paying monthly.

"There are in Ramsgate, Mr. Valon informs us, 4700 houses, only 2200 of which are fitted up for gas; leaving 2500 still to be supplied. Of this latter number there are 1000 houses with an average rental of from £15 to £30; the remaining 1500 being cottages from £8 to £12 per year. Now how does this compare with other places? We are inclined to think that Ramsgate must be a very exceptional town. We leave out of the question for the moment the smallest and very poor class of property; but taking the suburbs of London (or the principal provincial towns), we shall find very few of the modern-built houses, occupied by the great middle-class but what are 'fitted-up for' gas—even when the gas is not laid on. As a rule it is so; and the exception only proves the rule. We are not, of course, alluding to the tenements of the poor; but as a matter of fact few houses of even the 'cottage' order are erected now-a-days—or have been since gas became an article of everyday use—without the owner laying on the necessary iron service-pipes. We imagine that very little new building has been carried on in Ramsgate of late years, or the builders would have been alive to the advisability of putting in gas-pipes. This is now so universally done in all houses, of whatever size, where gas is likely to be required or used, with a view of preventing the knocking about of walls hereafter, that we think (with the exception of Ramsgate) it may be left out of the calculation of gas companies.

"So far as the second proposition of Mr. Valon is concerned, we heartily concur in his suggestion that gas-fittings should be supplied to consumers at an annual rental; but instead of limiting this privilege to only brackets and side-lights, we would strongly urge the advisability of extending such an arrangement to gasaliers and all descriptions of fittings, including cooking and heating stoves especially. Mr. Valon's fourth suggestion—to lend, free of cost, to any consumer a small boiling-ring—is a very feasible one. But the greatest drawback at present existing to increased consumption is only lightly touched upon by Mr. Valon. What deters a vast number of people from becoming gas consumers is the odious and obnoxious impost demanded by many large (and small) gas corporations in the shape of a deposit before connecting a new customer to their mains. In many towns and districts a minimum deposit is required of £2; besides a rental being charged for the meter. If these two charges were abolished—and a sufficient guarantee against loss through non-payment could easily be devised—an enormous impetus would be given to the consumption of gas. A casual visitor to some of the populous suburbs round London, such as West Kensington and Highbury, cannot help being struck with the entire absence of gas in rows upon rows of houses rented at £50 and £60 a year. The majority of these houses are let off as "apartments"—furnished or otherwise—and the occupants (the tenants and their 'lodgers') in nine cases out of ten invariably burn lamps; not in preference to gas, *bien entendu*, but simply because they feel debarred from using it owing to the initiatory restrictions attending its adoption. At the same time, the service-pipes uselessly intersect every room; and the local company's mains traverse street after street, yet only serve to light a few shops and the public lamps!

"This state of affairs might very easily be remedied, and the consumers of gas be increased a hundred-fold—nay, by thousands and tens of thousands. But it will not be accomplished by merely offering to 'fit-up any house with iron pipes free of cost,' the same being already done in the majority of cases. What is wanted is the removal of the real drawbacks and obstacles to the general consumption of gas. What we have said not only applies to the great bulk of middle-class suburban residences, but equally also to the cottages and 'rooms' of the artizans. The gas companies must understand that gas should no longer be regarded as a luxury, but as an actual necessity of the million. *Ergo*, it should be brought within the reach of all by cheapening and popularizing the initial cost of its 'laying on.' This necessarily would comprise the gratuitous 'fitting-up' of any antiquated houses where provision has not yet been made for a gas service."

Replying to this article, Mr. Valon wrote the Editor of our contemporary in the following terms; sending a copy of his letter for publication in our columns:—

"Although certain classes of property (to which Ramsgate is no exception) have of late years had the advantage of gas-pipes being put into them, you are in error in your estimate of the number of private houses prepared for gas in London and other provincial towns, whether large or small. As we travel North the number piped increases. South, however, you will be quite safe in allowing that less than one-half contain gas consumers; and to this you may add the fact that where houses are fitted up for gas, there are not 2 per cent. of those occupied who do not use it. Shops and warehouses take a supply as a necessity, and are out of consideration while discussing increased facilities.

"My experience is a Metropolitan one of many years standing; and not a narrow one, as you suggest. What I have stated can be substantiated by reference to the rate-book and the gas ledger of the gas company—the one containing the absolute number of houses in a district and the other only those houses burning gas.

"I called attention to the responsibilities of gas companies to their consumers in my Inaugural Address to the Southern District Association of Gas Engineers in 1883. These are in my opinion, in the majority of cases, still unfulfilled, and in some untouched; and we ought all to be anxious as far as possible to develop the use of gas by working a gas works as a commercial undertaking, on commercial principles."

IMPORTANT SALE OF SHARES.—Messrs. Suddards and Stansfield recently sold at Bradford a number of shares in various well-known gas undertakings. £100 of original 10 per cent. stock in the *North Bierley Gas Company* realized £240; and £28 12s. of 7 per cent. new stock fetched £48 10s. £100 10 per cent. original stock in the same Company was disposed of for £241. Some 7½ per cent. "A" shares (£10 paid) in the *Eccleshill Gas Company* were sold for £18 5s. per share; 7½ per cent. "B" shares (£8 paid) fetched £14 10s. per share; one "C" share (£7 paid) realized £11 10s.; and a number of 6½ per cent. "B" shares (£8 paid) were knocked down at £14 15s. per share. £200 of "B" stock in the *South Metropolitan Gas Company* was disposed of for £472. £100 of ordinary stock in the *South Shields Gas Company* realized £200. £132 of original 10 per cent. stock in the *Shipley Gas Company* sold at £318 12s., or £241 per cent. This is said to be the highest price ever obtained for this stock. Thirteen £10 shares (£9 paid) in the *Drighlington Gas Company* fetched £9 5s.; and some "A" shares in the *Clayton, Allerton, and Thornton Gas Company* realized £17 17s. 6d. per share.

COLERAINE TOWN COMMISSIONERS' GAS SUPPLY.

The New Plant at the Works.

In order to meet the growing demand for gas in the town, it has been found necessary to make several important additions to the plant at the Coleraine Gas-Works, which are under the care of Mr. W. S. Stormonth; and these have recently been described in a local paper. First in order comes a new engine and exhauster, which were supplied by Messrs. R. and J. Dempster, the simplicity in working and high-class finish of which were remarked upon by our contemporary. Before this exhauster was installed, there was a large waste of gas in the retort-house—only 8500 cubic feet of gas being obtained per ton of coal, against 10,500 cubic feet now. This represented a saving of 200 tons of coals during the past year. Improved purifiers have taken the place of the antiquated vessels formerly in use; and it is said that the gas is now free of the "vile odours" which were so disagreeable previously, particularly during the winter months. Plant for the manufacture of sulphate of ammonia has been erected. It is stated that this apparatus is quite a novelty in that part of the country, and is the only one of its kind in Ireland. It is compact and well-arranged; and last year sulphate to the value of £140 was sold—the cost of manufacture being about £60. A new photometer—one of the best made—has been added to the apparatus; and there have been many other minor improvements at the works, all calculated to reduce the cost of manufacture, and improve the quality of the gas. The illuminating power of the gas has been raised from 16 to 19 candles; and the price reduced from 5s. to 4s. 2d. per 1000 cubic feet. Much credit is due to Mr. Stormonth for the changes which have taken place. Since his appointment to the position of Manager he has been indefatigable in his efforts to get the works in a proper condition for meeting the rapidly-increasing demand for gas.

WALSALL CORPORATION GAS SUPPLY.

Annual Statement of Accounts.

The statement of the income and expenditure of the borough of Walsall for the year ending Sept. 29 last has just been issued in book form; and a copy has been kindly forwarded to us. The accounts relating to the Gas Department are for the year ending Dec. 31, 1887. On capital account there was only £646 expended during the twelve months; making the total capital expenditure £176,151. In the revenue account, manufacture (including £14,979 for coal and carriage) cost £21,646; distribution, £965; public lamps, £530; rents, rates, and taxes, £1442; management, £951—making, with a few minor items, a total expenditure of £25,755. On the other side of the account, the amount received for gas (208,640,000 cubic feet, at prices ranging from 2s 1d. to 2s. 11d. per 1000 cubic feet) was £27,179. Coke produced £5948; tar and ammoniacal liquor, £2210; spent lime, £132—together £8290. With two other small items—rents, £250; and profit on fittings, £102—the total receipts amounted to £35,811; so that there was a balance of £10,055 to carry to the profit and loss account. The accumulated profit account shows a balance of £27,721 18s.; and there is to the credit of the depreciation fund account £22,435 11s. The balance of reserve fund to be carried forward is £3565; and of sinking fund, £2469. The amount of coals carbonized during the year was 31,193 tons. The estimated quantity of residuals made was as follows: Coke, 15,240 tons; tar, 293,070 gallons; and ammoniacal liquor, 684,000 gallons. The number of street lamps in Walsall is 880; and the cost of lighting is £2305 per annum.

MANCHESTER CORPORATION GAS SUPPLY.

Lowered Prices as a Stimulus to Consumption of Gas.

Writing to a Manchester newspaper, with reference to a suggestion that the Bradford Road Gas-Works should be abandoned as unnecessary, Mr. George E. Davis asserts that if the sale of gas was pushed with that zeal with which every other commercial product in Manchester is pushed, even the great reserve of power at Bradford Road would not be sufficient to provide for the needs of the city and its surroundings. Unfortunately the gas manufacture is looked upon, he says, as something special; and is therefore dealt with in a manner different to all other commercial products. There are, he holds, three directions in which an increased use of gas would directly benefit the citizens of Manchester—

1. The use of small gas-engines instead of steam-engines.
2. The employment of gas for cooking purposes.
3. The use of gas for the heating of apartments.

Under the first head, the substitution of gas-engines for small steam boilers and engines would, in a very great degree, tend to the amelioration of the atmosphere, as these small boilers generally lead into low chimneys, and a good deal of very dark smoke is emitted from them. Under the second head, the employment of gas for cooking would considerably reduce the consumption of raw coal; and when it is known that even at the Manchester price of gas and fuel, gas cooking is cheaper and better than coal cooking, it will no doubt receive more consideration at the hands of the ratepayers than it does at present. As to the third use—that of the application of gas for heating—he maintains that the development of this would keep the mains in constant use day and night. The effect would be to enable the price to be considerably reduced; and it is in the supply of this increased demand that the producing power of the Bradford Road works would be of advantage. Gas heating is not general now, because of its high price. It is, the writer says, a very expensive luxury; but it has at the same time some very good qualities which should not be overlooked. In the first place there would be no coals to get in, and no place required for storing them, neither would there be any ashpits required, or Corporation men needed to empty them, of ashes at least. In the second place there would be no smoke; and he has often pointed out that most of the so-called fogs arise from household smoke, and principally during the time that household fires are being lighted up. Mr. Davis continues: If we could conceive a town in which all the power was obtained from gas-engines, and in which all the cooking and heating was done by gas, we may easily imagine an atmosphere clear and bright, and allowing of the passage of the normal amount of sunshine, which unfortunately is not a description of the Manchester of to-day. I believe that amelioration can only be initiated in official quarters, and that with a reduction (a substantial one) in the price of gas, we may hope for better things. Of course, I expect to be told that the price will be reduced when circumstances warrant it. I do not look at the subject in that light. I say that lowness of price will stimulate consumption; and moreover, if the most were made of the various bye-products—tar and ammonia water—the price of gas might be reduced to-morrow. If gas can be sold at 2s. at Bury, I do not see why it cannot be done in Manchester. Bury, however, makes up its own gas water into sulphate of ammonia; and if Manchester was wise, it would do the same. All our larger towns are suffering from a plethora of smoke and fog; and I look to the gas authorities in these centres of human aggregation as being the only ones who have the key of a better order of things in their hands. The solution of the whole question may be summed up in a few words—cheap gas and plenty of it.

DOVER GAS-WORKS READING AND RECREATION ROOMS.

Last Friday week a meeting was held of the Managing Committee of the Reading-Room Fund, and the Committee of Works Benevolent Fund of the Dover Gas-Works, when the first year's balance-sheets were presented. Mr. W. Mannering, Chairman of the Company, presided, and Mr. E. Bottle, Vice-Chairman, and Mr. Alderman H. Stone, a Director, were also present. The President of the two funds, Mr. R. Herring, the Engineer of the Company, explained the objects he had in view when starting the Society. The reading and recreation, he said, was a departure from the ordinary routine of a gas-works. In new undertakings of this kind, difficulties in the management were likely to arise; but this had not been their experience, for, after twelve months' working, he was able to place before the members facts and figures which would prove how successful they had been—thanks to the liberality of the Directors and the energetic way in which the Secretaries and Committees had attended to their duties. To find the first year's work so satisfactory was very encouraging; and he trusted it would stimulate all to further exertions for the Societies' welfare—thus enabling them to continue the good work they were engaged upon. The balance-sheets were then read by the Secretaries of the benevolent fund and reading room (Mr. S. Rutter and Mr. H. Harman). The Chairman said he was pleased to hear such satisfactory balance-sheets read. It showed careful and thoughtful work; and he hoped they would go on and prosper. On behalf of his colleagues and himself, he congratulated the members; and he trusted this was only one of many similar occasions on which they would meet together to hear such good and gratifying news, for the desire of the Directors was to see them all steady prosperous workmen. In conclusion, he asked the members to do all they could for their President, Mr. Herring, who had devoted so much time to the funds. The Vice-Chairman agreed with all the Chairman had said, and he was also quite sure that both funds had done good work, and would continue to do so, so long as they were sharply looked after. Personally, he took great interest in the reading room; for he liked to see men enjoy themselves in a rational way. At the starting of the movement he was deputed by his colleagues to furnish the room; and he was well pleased to see the things so carefully used. Alderman Stone said it was exceedingly gratifying to know that the reading-room was so successful; and their best thanks were due to Mr. Herring for organizing it. He hoped the privileges the members enjoyed would be carefully used, and not abused. He concluded by proposing a hearty vote of thanks to the President, who, in reply, urged upon the Managing Committees the absolute necessity of their being diligent in their duties. He urged them all to do what they could for the success of the Dover Gas Company. Mr. Davis proposed a vote of thanks to the Chairman and Vice-Chairman. These were acknowledged by the Chairman, who asked the Committees' acceptance of a number of books, which, he thought, would prove a useful addition to the library.

GAS MAINS AS ELECTRICAL CONDUITS.

It is quite probable, says the *Electrical World*, that the idea of using gas-mains as electrical conduits may have occurred to different people at various times, and especially since the question of getting rid of overhead wires has been so prominently before the public; but it is more than likely that the first instance of the actual employment of these mains for the purpose is to be found in New York city.

Writing to our contemporary, Mr. W. Maver says: About four years ago, when a new gas-main was being laid between the gas-works of the Consolidated Gas Company of this city, at 99th Street and 111th Street, on the east side (which works were to jointly supply gas to the mains in that portion of the city), it occurred to Mr. W. H. Bradley, the Engineer-in-Chief of the Company, that, in order to secure the uninterrupted telephonic communication between the works which is necessary, it would be well to try the experiment of placing a conductor in one of the new mains connecting the two establishments. This idea was carried into effect; and a cotton-covered No. 14 B.W.G. copper wire was procured for the purpose. The experiment was from the first a decided success. The conductor enters the gas-main in the sub-cellar of each building by means of a stuffing-box of peculiar construction, screwed tightly to the iron shell of the main; and in the centre of the stuffing-box is passed a narrow glass tube, through which the wire enters the pipe. The glass tube is held firmly in position, and the stuffing-box is made gas-tight, by the use of plaster of Paris. The wire itself is suspended by wires attached to the upper portion of the main; the supports being insulated from the conductor by ordinary insulating knobs. This conductor, which has been in continuous use for more than four years, has been, as already said, a perfect success. During the blizzard of last spring it was the only telephone circuit in the Gas Company's service that was not inoperative. The circuit being composed of but one wire is necessarily grounded at both ends. In length it is a little over half a mile. Apparently the conductor is in as good electrical and mechanical condition to-day as it was when first placed in the main. On one occasion, when it was necessary to open a portion of the main traversed by the conductor, the latter was seen to be encrusted with naphthaline crystals to the extent of about 2 inches; but this, seemingly, had no detrimental effect on the conductor. Encouraged by the success which has followed the original experiment, the Company have taken advantage of the construction of a new series of mains in the upper part of the city to place in the mains about 5 miles of three-conductor lead-covered cable, to be used in maintaining telephonic communication between the different offices, works, and headquarters of the Company. The cable comes out of the gas-mains through stuffing-boxes at different points; and the stuffing-box used in this case is somewhat similar to that already described. It consists of a hollow cup screwed into the shell of the main. Inside of the cup is a tubular glass insulator which screws loosely into the cup. The cable passes into the main through the glass insulator; and the spaces are filled with plaster of Paris. Inside the main, at intervals of about 12 feet, transverse boards are laid resting on the sides of the main; and from these boards the lead-covered cable is suspended. The officers of the Company do not apprehend any detrimental action by the gas on the lead-covered cable.

INTERFERENCE WITH THE RIGHTS OF WATER COMPANIES.

Last Tuesday, at the meeting of the Committee of Works of the Chelsea Vestry, a letter was received from the Secretary to the Chelsea Electricity Supply Company, Limited, asking permission to lay down in Sloane Square, &c., in the same trench as will be excavated for the purposes of the electric mains, an iron pipe to convey water from the Sloane Square Railway Station to the central Lighting Station in Draycott Place. Mr. Davidge thought the Vestry should not permit the laying of water-mains in such trenches, and said it was a question whether the Vestry should allow any one other than the Water Company to supply water in the district. If the Electricity Supply Company desired a supply of water for themselves, they should bore down to a depth of 60 feet. He was not championing any Water Company; but would move that the application be not granted. Mr. Stroulger seconded the motion, observing that he

supposed the Water Company's Act would not permit any competing supply of that kind. The Chairman suggested that the Company might safely be left to look after its own interests; but Mr. Stroulger (continuing) said they ought not to give the Electricity Supply Company that which seemed to be a right to distribute water. Mr. White observed that he distinctly understood from the Water Company that no person has a right to supply water for profit or gain within their district, and that the Railway Company would be doing an illegal act if the Vestry sanctioned the procedure—one which they could not be accessory to. The Chairman said he was not aware that it was proposed to charge anything for the water; and there might be other interpretations of the Act besides that of the Water Company. Mr. Collins considered it would be arbitrary to refuse the application; and moved that it be granted. Mr. Brass supported the motion; and said if the Railway Company liked to give a supply of water for nothing, it was no business of the Vestry. In answer to questions, the Surveyor said the pipes would be laid in the trench which would be under the footway. Mr. Stroulger said they had no right to permit the pipes to be laid over the vaults of houses. The Surveyor remarked that if the Vestry's property were damaged, they had power to make the Company repair it; and if the vaults were injured, the owners would have a right of action against the Company. The amendment was afterwards agreed to.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

EDINBURGH, *Saturday*.

The Edinburgh Town Council had under consideration, at their meeting on Tuesday, the arrangements for the improved lighting of the streets. Bailie Steel, Convener of the Lighting Committee, stated that he had received a letter from Mr. Adam, the City Chamberlain, giving several calculations on the subject. Mr. Adam, in his letter, gave a narrative of the agreement between the Corporation and the Edinburgh Gas Company for the supply of gas to the public lamps, the basis of which has been for years that the lamps were to burn for 3926 hours per season. The charge for gas was 3s. 5d. per 1000 cubic feet, with a discount practically reducing it to 3s. 4d. The cost for the year to Nov. 15, 1888, was £7588 9s .1d., using No. 1 burners. Under the new arrangement, while using No. 2 burners, providing a better light, but with a reduction of 10d. in the price (making the gas 2s. 6d. per 1000 cubic feet), the year's outlay would be £7476; the details being—Regulated burners, 21,100,032 hours, £5725; patent burners, 6,618,714 hours, £1655; Bray burners, 846,252 hours, £494—total, 28,564,998 hours, £7424. Large lamps, 392,400 cubic feet, £49; lamps at Sinclair fountain, 11,816 hours, £3—grand total, £7476. Shortly stated, the reduction of the price from 3s. 4d. net per 1000 cubic feet to 2s. 6d. will enable the Magistrates, at the same annual charge on the burgh assessment, to obtain for the Edinburgh street lamps 60 million cubic feet of gas in place of 45 million cubic feet per annum as formerly. The statement was ordered to be printed.

The Edinburgh Town Council, at the same meeting, on the motion of Bailie Steel, approved of the proposal which I mentioned last week, and resolved to separate the office of Inspector of Cleaning and Lighting into two; retaining Mr. Paterson, who, it appears, has held the post for nearly 40 years, as Inspector of Lighting. The weakness of the existing arrangement was well put by Mr. Colston in the remark that the cleaning must be inspected in the daytime and the lighting at night; and it was utterly impossible that one man could attend to both. There was some opposition to the proposal, led by Sir James Gowans, who urged the view that the cause of the present unsatisfactory state of matters was the extension of the city, and that the cure was an increase of the staff. He stated that the cost of lighting to each unit of the population was 1s. 2d. in 1883 and 1884, and varied from 1s. 1d. to 1s. since that year to the present time. Cleaning cost per unit 2s. 1d. in 1884; and was now 2s. The cost of both departments together was 3s. 3d. in 1884, and 3s. 1d. at the present time. The rate per pound of the rental was for lighting 1·913d., and for cleaning 3·730d.—together 5·643d. The Cleaning and Lighting Committee were requested to bring up a report dealing with the duties and salaries of the separated offices.

The Works Committee of the Edinburgh and Leith Gas Commission have resolved in accordance with the suggestion of Mr. R. Mitchell, the Engineer, that £16,000 be expended on the improvement of the retorts in use at the Edinburgh works.

The Stromness Gas Company, Limited, is being wound up under voluntary liquidation; and the accounts of the Liquidator show a dividend of 11s. 2d. per £5 share, or a fraction less than 2s. 3d. per £1, after paying all claims and the cost of liquidation. The Company was formed about twelve years ago, with a nominal capital of £2000, which, however, was never fully subscribed, and a loan of £700 had to be obtained. The works and whole belongings of the Company were sold by public roup last autumn for £800. A meeting of the Company was held the other day, at which the Liquidator, Mr. James Spence, reported that all the assets had been gathered in, and that, after meeting all liabilities, the balance amounted to £161. Several of the shareholders expressed disappointment that the Liquidator, before disposing of the undertaking, did not call them together to consider whether or not they might be disposed to re-construct the Company; and to this the Liquidator replied that the matter rested with the shareholders themselves, not with him, to consider what they ought to do. The undertaking is now the property of a private firm.

Following the refusal of Carron Iron Company to pay assessment for domestic water-rate under the Falkirk and Larbert Water Act, referred to in my "Notes" of Dec. 4 and 11 last, the Water Trustees resolved to obtain the opinion of two Counsel, Mr. Pember, Q.C., and the Dean of the Faculty of Advocates in Scotland. The point raised by the Carron Company was as to assessing of occupiers of premises for the domestic water-rate before the water is introduced. The Trustees submitted to Counsel a number of questions on this point, along with a memorial explaining the position of affairs. Mr. Pember was one of the Counsel for the Carron Company when the Falkirk Water Bill, 1886, was before Parliament. The Dean of Faculty has had no part in any of the proceedings for promoting the Falkirk Water Bills. The replies of Counsel to the questions addressed to them were received last week; and they differ in opinion. Mr. Pember holds that there can be no assessment for domestic water-rate until water-pipes are laid within 100 feet of occupied premises, and thus supports the position taken up by the Carron Company. The Dean of Faculty takes the opposite view, holding that the language of section 71 of the Water Act (upon which section the Carron Company principally base their objection) is extremely embarrassing; but that it appears repugnant to other sections of the Act which provide for a domestic water-rate being at once laid on, and for the immediate election of Trustees qualified by payment of rates. He points out that the word in the clause is not "until," but "unless," and holds that the general meaning of the Act is that the Trustees are bound to bring a supply of water to within 100 feet of all property to be assessed. He is therefore of opinion that the Trustees have the power of at once imposing the domestic assessment. The Trustees have also received communications on the subject from Mr. Beveridge, the Parliamentary Agent, and Mr. Balfour Browne, Q.C., agreeing with the Dean of Faculty.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday*.

At the last monthly meeting of the Rothesay Town Council, when moving the adoption of the Gas Committee's minutes, Bailie Johnstone stated that there had been an increase in the consumption of gas equal to about 9 per cent.; and he thought they had reason to congratulate themselves on the fact of having added the additional holder accommodation, which evidently had not been provided a day too soon. Bailie Walker, who seemed to be in the humour for fault-finding, remarked that some months ago he made a suggestion, which was agreed to, that the quality as well as the quantity of coal used should be stated in the monthly reports, as it was possible that in this way the increased consumption of gas might be accounted for. There was no doubt whatever, he went on to say, that complaints had been made that the quality of the gas was not what it ought to have been for some months back, and that though there had been a reduction in the price, some of the consumers' accounts had been higher this year instead of lower. It was well known that if the gas was of poor quality, more would require to be consumed; and as inferior coal was being used, the gas must be inferior. Mr. M'Millan said he had never heard a single complaint about the quality of the gas of late, to which Bailie Walker replied that they had one from him now; and he said that, when he was canvassing the Second Ward, he heard a great number of complaints about the gas. Mr. M'Millan remarked that they had received no written complaints. Mr. Burness agreed with Bailie Walker in thinking that they ought to have a statement put before them every month as to the coal used, in order that they might see what effect it had on the quantity of gas made. He was rather surprised, however, to hear of people making complaints of the quality of the gas and of their accounts being higher. His own accounts were within a few coppers of what they were last year, and he had been told by other consumers that theirs were considerably less. Provost Thomson said that a short time ago he believed the gas was not of such good quality as it had been previously; and he asked the Manager to test it in his presence, when it was shown to have an illuminating power equal to 26 candles. He also thought the quality of the coal should be given in the monthly reports. Bailie Johnstone, the Convener, stated that the Committee were quite agreeable to do so; and the matter then dropped.

A Hamilton paper of to-day announces the death of Mr. William Hogg, who was for many years the Treasurer of the Bellshill Gas Company, and latterly its Chairman. He was a man of much usefulness in many ways for the welfare of the important industrial village in which his lot was cast. A man of poetical attainments of a high order, he was one of the originators of the local Burns Club; and in this connection, it is a touching coincidence that the grave closed over his remains on the National Bard's natal day, Jan. 25.

Business has been done this week on the Glasgow Stock Exchange in the shares of the Huelva Gas Company, whose stock is largely held in this city. The price realized was £10 per share. The Glasgow Corporation 9 per cent. gas annuities have also been dealt in this week, for which £280 has been paid; being an advance of £5 upon the last price.

Some time ago I mentioned that it had been proposed by the Port Glasgow Town Council to provide an additional photometer, with the view of having the gas tested elsewhere than in the gas-works, and by some other person than the Gas Manager. The matter again came up for consideration at the last meeting of the Council, on the minutes of the Gas Committee being submitted for approval. They stated that the Convener of the Committee had seen Mr. W. L. Biggart, Analyst, of Greenock, and had visited the works with him in regard to the testing of the illuminating power of the gas, and a report from Messrs. M'Gowan and Biggart on the subject was submitted to the Committee. After some discussion, they had agreed to defer coming to any recommendation until they had considered the whole matter at another meeting. The minutes also stated that the Committee had resumed consideration of the report by the Gas Manager, Mr. J. M'Cubbin, on the unaccounted-for gas, and that as it appeared from the report that there was a very serious loss of gas in connection with the stair lights, which the Committee believed could be remedied by better supervision, it was agreed that information be obtained from Paisley, Johnstone, Dumbarton, and some other towns as to the supervision of these lights and the charge made for them; the Committee to resume consideration of the report when this information was obtained, and to make recommendations on that and the other matters contained in it.

A few weeks since the Coatbridge Gas Company sued Mr. John M. Alston, as Town Clerk of Coatbridge, for damages (restricted to £50) in consequence of a leakage of gas said to be caused by the fracture of gas-pipes through the laying of a drain in one of the public thoroughfares of the burgh. A large number of witnesses were examined before Sheriff Mair on the case; and the following interlocutor has lately been issued by his Lordship:—Having heard parties' procurators and considered the cause, finds it not proved that the pursuers have sustained any damage by reason of the exercise of the powers by the defenders under the Public Health (Scotland) Act, 1867, therefore assoilzies the defenders from the action, finds the defenders are entitled to expenses from the pursuers, appoints an account thereof to be lodged, and remits the same to the Auditor of Court to tax and decern.

The price of warrants in the Glasgow pig-iron market improved towards the end of the business week. They left off yesterday at noon at 41s. 5d. per ton cash for Scotch iron; being a drop of 2d. per ton on the forenoon closing quotation. The home trade is reported to be still exceedingly good; but business in Scotch special brands is not very brisk.

In the coal trade the improved tone still continues, and orders are coming to hand more freely. Prices are tending upwards; and miners' wages have been advanced in many directions, much to the gratification of the workmen. Throughout the western mining districts, stocks are generally very small.

THE PROPOSED PURCHASE OF THE TONBRIDGE WATER-WORKS BY THE LOCAL BOARD.—The question as to the desirability of holding an inquiry concerning the purchase of the Tonbridge Water Company's property has again occupied the attention of the Tonbridge Local Board. This body had previously decided that it was not desirable to hold an inquiry; and as a result of this decision, an agitation was commenced in the district by those who did not agree with the Board's resolution, with the result that a memorial was presented to the Board, asking for a reconsideration of the matter. The application of the memorialists was favourably received; and on Monday a special meeting was held, when resolutions in favour of applying to the Local Government Board for permission to borrow the necessary money were submitted, but negatived by a majority of nine to five.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Jan.* 26.

Sulphate of Ammonia.—There is a complete change in the market; and the tendency is once more a declining one. As has almost invariably been the case recently, very little reason can be furnished for this change; and it may almost be summed up in the statement that the dealers have ceased buying. It is true, nitrate has been a little easier; but it became firmer as soon as it was known that the January shipments would be little more than half of the previous estimates—although it cannot be argued that these January shipments will inevitably affect the spring supplies. It has almost to be assumed as a certainty from the experiences of the past twelve months, that whenever prices approach £13, a lull sets in, through a falling-off of the demand from one source or another, perhaps also from some anxiety to secure these values on the part of makers, and a pressure to realize profits by dealers here and abroad. Many re-sales, at all events, have already been taking place. It may be a mistake, however, to at once assume that prices will again fall to the December level; although such may be the profound wish of some buyers. Many requirements have to be filled yet; and very soon, too, should the present open weather continue. In view of the uncertainty, of the near future even, at the present moment, producers will have to steer a careful course, to avoid the shallows of the market. Closing quotations may be called £12 10s. to £12 12s. 6d.

LONDON, *Jan.* 26.

Tar Products.—The market continues somewhat lifeless; and, owing to the enormous production now going on, this condition is likely to remain for some little time. There is a little more inquiry for carbolic and cresylic acids, which is more than likely to make these articles respond to higher prices in a short time; and owing to their new use for explosive purposes (which is now conclusively established), they are likely to secure better prices in future than they have ever realized before. Benzoles are somewhat flat; but buyers are holding off in the hope of seeing prices lower. Pitch is firm; but very little new business is being done. To-day's prices are:—Tar, according to position, 18s. to 24s. per ton. Benzole, 90 per cent., 3s. per gallon; 50 per cent., 2s. 5d. Toluol, 1s. 6d. per gallon. Solvent naphtha, 1s. 3d. per gallon. Crude naphtha, 30 per cent., 1s. 2d. per gallon. Light oil, 8d. per gallon. Creosote, 2d. per gallon. Pitch, 20s. to 25s. per ton. Carbolic acid (crude), 3s. 5½d. per gallon. Cresylic acid, 11d. per gallon. Tar salts, 15s. per ton. Anthracene, 30 per cent., "A" quality, 1s. 4d. per unit; "B" quality, 1s. 2d.

Ammonia Products.—Sulphate has been most irregular during the week; but the approach of spring is bringing in local buyers, and the stocks are extremely light, having regard to the time of the year and the make. It is more than likely it will see an advance before the end of the current month. Prices are: Gas liquor (5° Twaddel), 8s. per ton, with a rise or fall of 1s. 6d. per degree. Sulphate of ammonia, £12 7s. 6d. to £12 10s. per ton, less discount. Liquor ammonia, 2d. per lb. Carbonate of ammonia, 3½d. per lb. Muriate of ammonia, brown, £20 per ton; white, £26 10s. Sal-ammoniac, £32 per ton.

From the *Chemical Trades Journal*, Jan. 26.—The market in these articles may be fairly reported steady; and the price for 90 per cent. benzole is to-day 3s. 2d., while business has been done in 50's at 2s. 6d. Solvent naphtha continues in good request at the prices mentioned in last week's report. Creosote is steady and in good demand. As to anthracene there are practically no buyers; but "A" quality of 30 per cent. may be said to be value for 1s. 4d.; while "B" quality 30 per cent. is quoted at 1s. 2d. Pitch remains in much the same condition; and a steady trade is being done in this article. Sulphate of ammonia has not maintained that firmness which some had anticipated; the dealers having apparently covered their immediate requirements, and are now using all their endeavours to force prices lower, in which they are unfortunately aided by the quieter tone of the nitrate market. Hull prices to-day range from £12 10s. to £12 11s. 3d.; Beckton, £12 11s. 3d; and the same price is quoted for Leith business. London outside makes are selling at £12 10s. to £12 11s. 3d.; but the markets are dull, and there is very little doing. If manufacturers will not be misled, there is no reason why prices should fall to a lower level; but this will depend on the manner in which they dispose of their makes.

THE WATER SUPPLY OF GAINSBOROUGH.—It has been reported to the Gainsborough Local Authority that the water supply from the artesian well borings, which have been sunk at a cost of some £5000, is fully adequate to the requirements of the town, and that body have now decided to request Messrs. Maxwell and Stock, engineers, to report as to the best way of securing a permanent and economical mode of utilizing the supply. It has been also decided to ask the Local Government Board to allow a loan of £2000 recently granted to be repaid over the period of twenty years.

ELECTRIC LIGHTING SCHEMES FOR THE CITY OF LONDON.—At the meeting last Tuesday of the Commission of Sewers of the City of London, Mr. Bridgman brought up a report of the Streets Committee on the subject of electric lighting, and submitting draft conditions with a view to advertise for tenders. The report was ordered to be printed and circulated, and its consideration adjourned. The Joint Finance and Streets Committee subsequently reported, relative to the Electric Lighting Provisional Orders, in respect of which notices have been served upon the Commission. They recommended, and it was agreed, that the Court do oppose the same, for the purpose of obtaining *locus standi*; that it be referred back to them to watch and report thereon from time to time as may be necessary; and that the Clerk be authorized, on behalf of the Commission, to sign the necessary objections to be submitted to the Board of Trade. As notified in the JOURNAL a short time since, the Commissioners instructed their Engineer (Colonel Haywood) and Solicitor (Mr. Baylis), with Mr. W. H. Preece, to consider and report on the Electric Lighting Act, 1888, and to prepare conditions on which proposals for lighting by electricity could be entertained. Having received and considered reports from these gentlemen, they prepared a basis of a new specification. By this they laid it down that it should be obligatory on the companies with whom contracts might be entered into to lay all wires and conductors beneath the public way; that the City should be divided into three districts, and alternative tenders invited for lighting those districts and the City as a whole; that the whole of the main thoroughfares be primarily lighted; that the companies be required to state the period at which the lighting of the thoroughfares should commence, and when it would be extended to the remaining streets; and that it should be a condition that when the profits had reached a cumulative dividend of 10 per cent., the surplus should be divided equally between the contracting company and the consumers. The Commission will consider a report to this effect, and the conditions of the proposed contract, at their next meeting; and, if adopted, tenders will be advertised for on the basis thus laid down.

GAS-METER TESTING AT LEEDS.—In our notice last week of the annual report of Mr. Charles Buckley, the Gas Inspector of the Justices of the Peace of Leeds, by the transposition of a figure, it was stated that the increase in the fees received from meter-testing during the past year was £26 9s.; it should have been £62 9s.

CAMBRIDGE UNIVERSITY AND TOWN WATER COMPANY.—At the half-yearly meeting of this Company last Thursday, the accounts permitted the Directors to recommend a dividend at the rate of 10 per cent. per annum, after paying which there will remain, with the balance from the preceding half year, £2606 to be carried forward. The Directors, in their report, spoke with regret of the death of Mr. E. Foster, who had been on the Board for the long period of 33 years.

COCKERMOUTH GAS SUPPLY.—At the last meeting of the Cockermouth Urban Authority, the Gas Manager (Mr. Smith) presented his report on the working of the gas undertaking during the past year. It stated that the quantity of gas made was 12,524,000 cubic feet—an increase of 1,284,200 feet ever the largest quantity made in any previous year; the percentage of increase being 11·43. The average for the previous five years was 10,832,900 feet. The quantity of gas sold was 10,764,000 feet, including that used for works. The amount unaccounted for from leakage, &c., was 1,759,432 feet; being 16·05 per cent. of the total. The average quantity unaccounted for during the previous five years had been 2,180,400 feet, being 20 per cent of the make. The average amount sold during the five years was 8,302,500 feet.

ANOTHER ELECTRIC LIGHTING FAILURE AT BARNET.—The *Evening News* last Thursday stated that on the previous evening Barnet was again in darkness, owing to some breakdown or failure in the arrangements for lighting the streets by electricity. The occasion of the failure was peculiarly unfortunate; for Wednesday is the weekly cattle and general market day at Barnet, and consequently there is a good deal of traffic in the early hours of the evening. Again, a thick fog prevailed on Wednesday evening, and rendered efficient street lighting doubly necessary. There have been three previous breakdowns of the kind since the new system of lighting was installed some four months back; and in consequence of these, together with numerous complaints of general inefficiency, the Local Board some time since passed a resolution to give the contractor notice to remedy the defects within fourteen days. The cause of the new light was, however, warmly and most persistently championed by one or two of the members; and with a view of giving the so-called "improvement" a fair trial, the resolution was rescinded. The light was not available at all up to a late hour on Wednesday; and the inconvenience resulting was very great.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 196.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.				£ s. d
590,000	10	12 Oct.	10½	Alliance & Dublin 10 p. c.	10	18—19	..	5 10 6
100,000	10	„	7½	Do. 7 p. c.	10	12¾—13¼	..	5 11 1
800,000	100	2 Jan.	5	Australian (Sydney) 5% Deb.	100	110—112	..	4 9 3
100,000	20	29 Nov.	10	Bahia, Limited	20	24—25	..	8 0 0
200,000	5	14 Nov.	7½	Bombay, Limited	5	6¾—7¼	..	5 3 5
40,000	5	„	7½	Do. New	4	5¼—5¾	..	5 4 2
380,000	Stck.	29 Aug.	11½	Brentford Consolidated	100	227—232	+2	5 1 8
125,000	„	„	8½	Do. New	100	167—172	..	5 1 9
220,000	20	18 Sept.	10½	Brighton & Hove, Original	20	43—45	..	4 13 4
320,000	20	28 Sept.	11½	British	20	44—46	+1	4 17 10
50,000	10	18 Sept.	11	Bromley, Ordinary 10 p. c.	10	20—22	..	5 0 0
89,000	10	„	8	Do. 7 p. c.	10	13¾—14¼	..	5 10 4
328,750	10	14 Nov.	8	Buenos Ayres (New) Limited	10	13¾—14¼	..	5 10 4
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	107—110	+½	5 9 1
150,000	20	10 Aug.	7	Cagliari, Limited	20	26—28	..	5 0 0
550,000	Stck.	12 Oct.	13½	Commercial, Old Stock	100	262—267	+2	5 3 0
130,000	„	„	10½	Do. New do.	100	214—219	+2	4 18 2
130,000	„	28 Dec.	4½	Do. 4½ p. c. Deb. do.	100	122—125	..	3 12 0
557,230	20	13 Dec.	13	Continental Union, Limited	20	48—50	+2	5 4 0
242,880	20	„	13	Do. New '69 & '72	14	34—36	+2	5 1 0
200,000	20	„	10	Do. 7 p. c. Pref.	20	38—40	+1	5 0 0
75,000	Stck.	28 Sept.	10	Crystal Palace District	100	205—215	..	4 13 9
234,060	10	27 July	13	European, Limited	10	25½—26½	..	4 18 1
120,000	10	„	13	Do. New.	7½	18—19	..	5 2 7
354,060	10	„	13	Do. do.	5	12—13	..	5 0 0
5,468,500	Stck.	29 Aug.	13	Gaslight & Coke, A, Ordinary	100	258—262	−1½	4 19 3
100,000	„	„	4	Do. B, 4 p. c. max.	100	100—103	..	3 16 3
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	263—267	+1½	3 14 10
80,000	„	„	5	Do F, 5 p. c. Prf.	100	125—130	..	3 16 11
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	182—187	..	4 0 2
1,800,000	„	„	7	Do. H, 7 p. c. max.	100	169—174	..	4 0 5
465,000	„	„	10	Do. J, 10 p. c. Prf.	100	261—266	+1	3 15 6
1,061,150	„	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	118—121	+1	3 6 1
294,850	„	„	4½	Do. 4½ p. c. do.	100	123—127	..	3 10 10
650,000	„	„	6	Do. 6 p. c. do.	100	172—177	..	3 7 10
3,600,000	Stck.	14 Nov.	10	Imperial Continental	100	210—214	+1½	4 13 6
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd	5	5—5½	..	5 9 1
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p.c. Deb.	100	114—116	..	4 6 2
541,920	20	29 Nov.	6	Monte Video, Limited	20	19—20	..	6 0 0
150,000	5	29 Nov.	10	Oriental, Limited	5	9½—9¾	..	5 2 7
60,000	5	28 Sept.	7	Ottoman, Limited	5	6—7	..	5 0 0
166,870	10	16 Jan.	4	Parl, Limited	10	5½—6*	..	6 13 4
490,000	100	2 Nov.	6	People's Gas of Chicago—1st Mtg. Bds.	100	104—107	..	5 12 1
500,000	100	1 Dec.	6	2nd Do.	100	92—97	..	6 3 9
100,000	10	12 Oct.	10	San Paulo, Limited	10	15½—16½	..	6 1 2
500,000	Stck.	29 Aug.	15½	South Metropolitan, A Stock	100	805—810	+3	5 0 0
1,350,000	„	„	12	Do. B do.	100	240—245	+3	4 17 11
141,500	„	„	13	Do. C do.	100	245—255	..	5 1 11
600,000	„	28 Dec.	5	Do. 5 p. c. Deb. Stk.	100	137—140	..	3 11 5
60,000	5	29 Aug.	11	Tottenham & Edm'ntn, Orig.	5	11—13	..	4 4 0
						* Ex div		
				WATER COMPANIES.				
717,467	Stck.	28 Dec.	9	Chelsea, Ordinary	100	259—264	+1	3 8 2
1,720,580	Stck.	12 Oct.	7	East London, Ordinary	100	303—306	+1	3 8 0
700,000	50	13 Dec.	9	Grand Junction.	50	121—125	..	3 12 0
708,000	Stck.	10 Aug.	10½	Kent	100	277—282	..	3 14 5
1,043,800	100	28 Dec.	9	Lambeth, 10 p. c. max.	100	253—258	..	3 9 9
406,200	100	„	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
200,000	Stck.	28 Sept.	4	Do. 4 p. c. Deb. Stk.	100	118—122	..	3 5 7
500,000	100	27 July	12½	New River, New Shares	100	350—360	..	3 7 4
1,000,000	Stck.	„	4	Do. 4 p. c. Deb. Stk.	100	124—128	..	3 2 6
902,300	Stck.	13 Dec.	6	S'thwk & V'xhall, 10 p.c. max.	100	167—172	..	3 9 9
126,500	100	„	6	Do. 7½ p. c. do.	100	161—166	+1	3 12 3
1,155,065	Stck.	„	10	West Middlesex	100	264—269	+3	3 14 4

SERIOUS DYNAMITE EXPLOSION AT THE THIRLMERE WATER-WORKS.—A shocking accident happened last Tuesday to the men employed at the Thirlmere Water-Works of the Manchester Corporation. A couple of men were engaged drilling holes into the rock for the purpose of blasting; and while inserting the third charge of dynamite, it exploded. The result was that the rock and wooden bearings of the tunnel were shattered to splinters; and the men directly engaged on the work frightfully injured. They were at once conveyed to Kendal Hospital, where it was found that, besides losing their sight, they were dreadfully cut about the arms and head. Both men lie in a dangerous condition.

COATBRIDGE GAS COMPANY.—The report of the Directors of this Company for the half year ending December last, states that the affairs of the Company continue to be prosperous. The total income for the six months was £6336; and the profits amounted to £2555, which, with the balance of £568 brought from the preceding half year, makes the sum of £3123 applicable to dividends. The unaccounted-for gas was at the rate of 15 per cent.; and the average illuminating power was 26·46 candles. The payment of the maximum dividends of 10 and 7 per cent. on the old and new stocks respectively, free of income-tax, is recommended. During the half year the amount of gas sold was 26,570,400 cubic feet, which, at 3s. 4d. per 1000 cubic feet, realized £4982. For public lighting and maintenance of lamps, there was received £416; and for meter-rents £207. Residual products yielded £655; and these, with other items, made up a revenue of £6336.

THE OTLEY LOCAL BOARD AND THE GAS COMPANY.—At a meeting of the Otley Local Board yesterday week, it was reported that the Sub-Committee appointed to consider the application by the Gas Company for a Provisional Order, recommended that the Board object to the application on the grounds (1) that the standard price of gas, to be charged at 3s. 9d. per 1000 cubic feet, was unreasonable and excessive; (2) that the proposed Order contains no provision enabling the Board to acquire the Company's undertaking; (3) that it afforded no provision enabling the Board to control or regulate the breaking up by the Company of the streets, bridges, &c.; (4) that the Board will be prevented, if the Order is confirmed, from themselves supplying the district with gas; and (5) that the Board could themselves supply gas at a price considerably less than the standard price proposed to be authorized. It was unanimously decided to empower the Committee to watch, and, if they thought necessary, to oppose the application, and that Counsel be retained.

NORTHERN COAL TRADE.—The activity in the northern coal trade continues; and both steam and gas coal produce higher prices where immediate delivery is needed. The tendency of this, of course, is to also benefit the coal-owner, by forcing up the prices of coal on contract. For steam coal the general quotation now varies from 9s. 6d. to 9s. 9d.; but in one or two instances, a slight discount is allowed. Small coal is very abundant; and the price is weak at from 2s. 6d. to 2s. 9d. For gas coal there is still a keen inquiry, though the consumption shows some signs of decreasing locally. One contract has been closed for export at as high as 8s. per ton f.o.b., which is about 2s. advance on the prices for the same contract a year ago. A sale of a cargo of gas coal has also been made at 8s. 6d. per ton delivered in the Tyne; so that it will be seen that the consumers have now to pay higher prices. Coal for the use of steamers is in request; and some manufacturers find it rather difficult to obtain sufficient supplies for their needs.

GWYNNE & CO., ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS & ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

Exhausters of nearly all sizes in Stock.

Prize Medals at all the Great International Exhibitions.

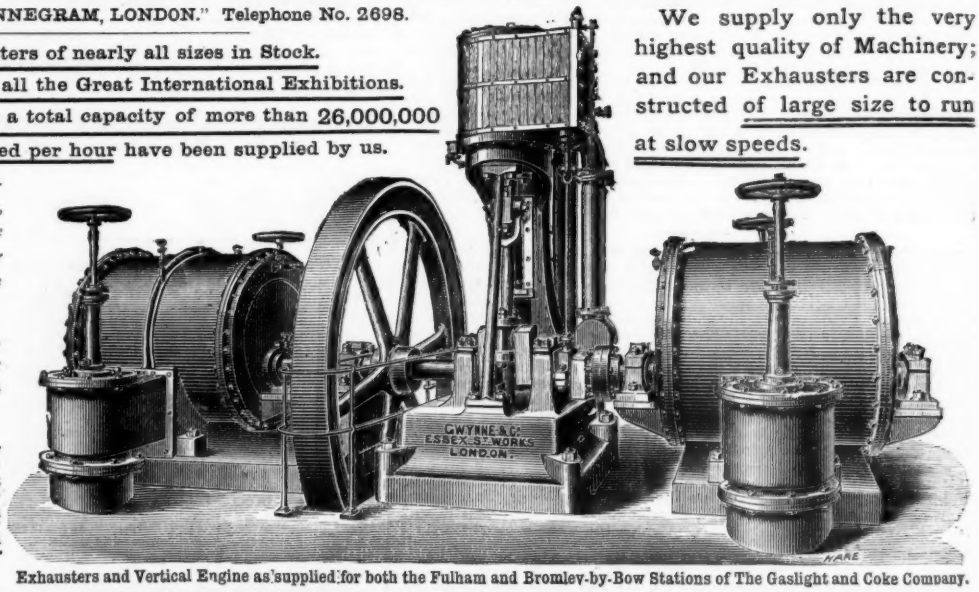
Exhausters equal to a total capacity of more than 26,000,000 cubic feet passed per hour have been supplied by us.

Our new Patent Non-Fluctuating Exhausters, to work without the slightest oscillation or variation in pressure, are strongly recommended.

MAKERS OF EVERY DESCRIPTION OF HYDRAULIC AND GAS MACHINERY.

Gwynne & Co.'s New Catalogue and List of Testimonials can now be obtained on application.

We supply only the very highest quality of Machinery; and our Exhausters are constructed of large size to run at slow speeds.



Exhausters and Vertical Engine as supplied for both the Fulham and Bromley-by-Bow Stations of The Gaslight and Coke Company.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

ANDREW STEPHENSON, Agent for the GAS PURIFICATE™ AND CHEMICAL COMPANY, Limited, Palmerston Buildings, Old Broad Street, LONDON, E.C.

CANNEL COAL, &c.

JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / No. 54, BERNARD STREET, LEITH, } SCOTLAND.

THE GAS INSTITUTE.

THE Council respectfully request that all SUBSCRIPTIONS and COMMUNICATIONS relative to THE GAS INSTITUTE be addressed to Mr. William Longworth, Gas Offices, Guildford, who has been appointed Honorary Secretary, *pro tem.*
Dec. 29, 1888.

ASSISTANT Manager of large Provincial Gas and Water Works is desirous of a change, as WORKS SUPERINTENDENT or to Manage small Works. Thorough practical man in every Department, including Regenerator Firing and Sulphate Making. Eighteen years' practical experience; total abstainer; aged 34; married. No objection to settle abroad.
Address No. 1669, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TIMMIS & CO., of STOURBRIDGE Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats. All descriptions kept in Stock.
For Prices apply to JAMES LAWRIE AND Co, 63, Old Broad Street, E.C., Sole Agents for London and District. Telegraphic Address: "EIRWAL, LONDON."

ALEX. WRIGHT & Co., 55, 55a, and 56, MILLBANK STREET, LONDON, S.W.
[Telegraphic Address: "PRECISION LONDON."]
Makers of Wet and Dry Gas-Meters, Station Meters and Governors, Photometers, and Gas-Testing Apparatus, Test Gasholders and Meters, Registering and other Gauges, &c., &c.
*** See Advertisement on Page III. of the Wrapper of this week's issue.

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 177 of last week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

WANTED, by a Total Abstainer, a Situation in a Gas-Works as WORKING MANAGER or FOREMAN. Has had good practical experience in Carbonizing, Fitting, Main and Service Laying, Reading Meters, and Repairs connected with Gas Plant. Good testimonials. Married.
Address No. 1668, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, the Management of Gas- Works, 4 to 8 millions, by Inventor of the "Unique Copper Bit" (used at any angle, 7s. 6d.), son of T. Burtonshaw, Inventor and Patentee of the "Excelsior Tar-Burner" (16s. 6d.). Thorough knowledge of Manufacture and Distribution. Excellent testimonials.
Address W. H. BURTONSHAW, Gas-Works, WINCHCOMB.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour.
Highest References and all particulars supplied on application.

TRAVELLER, with extensive connec- tion amongst Gas Undertakings, is open to represent a first-class house exclusively.
Address, G. W. R., 34, Perth Road, FINSBURY PARK, N

WANTED, by a thoroughly practical Man (age 28), a SITUATION in a Gas-Works. Has had thorough good practical experience in Main and Service Laying, Fixing Meters and Gas-Cooking Stoves, taking the State of Meters, and used to General Repairs on a Gas-Works.
Apply to "FITTER," 12, Hastings Street, LOUGHBOROUGH.

WANTED, a Working Manager or Foreman for a small Gas-Works in Hampshire. One who has had good practical experience in Carbonizing, Fitting, Main and Service Laying, and General Repairs.
Address, by letter, W. A. SCHULTZ, Chartered Accountant, 46, Cannon Street, LONDON, E.C.

GAS-ENGINE Wanted ('Otto" pre- ferred), 6 to 8 horse power. Must be in first-class sound condition, and price very low.
Full particulars to ALPHA, 28, Billiter House, LONDON, E.C.

FOR SALE—Three Boiler Tanks in first-class condition; sizes about—
26 ft. 0 in. by 9 ft. 0 in.
29 „ 9 „ by 9 „ 0 „
23 „ 6 „ by 7 „ 0 „
Also several large WAGGON BOILER TANKS and STEAM-PUMPS.
Address CULPAN & SONS, Heckmondwike, YORKSHIRE.

THE Ashford (Kent) Gas Company have for Sale:—
A round cased STATION METER (4000 cubic feet per hour), with 6-inch hydraulic four-way valve, and 6-inch connections.
A SCRUBBER 5 feet diameter, 16 feet high, with boards, tippler, and two 10-inch rack valves, and connections.
A 10-inch (dry) CENTRE-VALVE.
Particulars from and offers to JOHN MORTON, Gas-Works, Ashford, KENT.

HERTFORD.

TO TRUSTEES, INVESTORS, AND OTHERS.
IMPORTANT SALE OF SHARES IN THE HERTFORD GAS-LIGHT COMPANY.

MESSRS. MEDCALF & SON have been favoured with instructions from the Directors to Sell by Auction, at the Corn Exchange, Hertford, on Saturday, Feb. 2, 1889, at Four o'clock precisely, 200 NEW £10 SHARES in the HERTFORD GASLIGHT COMPANY. (Such New Shares to rank for Dividend with the Original Shares up to Seven and a Half per cent.)
The Auctioneers beg to draw special attention to this excellent opportunity for investment in the above Company's Shares, which always command a ready Sale when offered for competition.
Particulars and conditions may be had of Messrs. SWORDER AND LONGMORE, Solicitors, HERTFORD; of Mr. R. W. BRETT, Secretary to the Company; and of Messrs. MEDCALF AND SON, Auctioneers and Estate Agents, HERTFORD.

SULPHURIC ACID.

THE Gas Committee of the Lancaster Corporation invite TENDERS for the Supply of about 120 tons of B. O. V., made from Sulphur or Spent Oxide of Iron, suitable for the Manufacture of Sulphate of Ammonia—Strength, 146° by Twaddel's hydrometer—for a term of One year, from the 1st day of April next.
Sealed tenders, endorsed "Tender for Sulphuric Acid," to state price per ton in carboys as required, delivered on the Gas-Works Siding, Lancaster, including carriage for the return of empties, to be sent on or before the 16th prox. to Thom. Swainson, Town Clerk, Lancaster.
C. ARMITAGE, Manager.
Gas-Works, Lancaster, Jan. 24, 1889.

TO TANK CONTRACTORS.

THE Gas Committee of the Leigh Local Board invite TENDERS for the Construction of a BRICK GASHOLDER TANK, 102 feet diameter and 28 ft. 6 in. deep.
Drawings may be seen, and a copy of specification obtained, on application to the undersigned.
Sealed tenders, endorsed "Tank," and addressed to Jas. Thorp, Esq., Chairman, to be delivered at the Town Hall, Leigh, not later than Monday, the 11th of February next.
ALFRED T. FLETCHER,
Engineer, &c.
Gas-Works, Leigh, Lancs.,
Jan. 22, 1889.

TENDERS FOR GASHOLDER.

THE Directors of the Eton Gas and Coke Company invite TENDERS for the Construction and Erection of a TELESCOPIC GAS-HOLDER, 50 feet diameter by 16 feet deep, with Cast-Iron Tank for same, together with foundations and other work, at the Gas-Works, Eton, Bucks.
Plans, specification, and form of tender may be inspected and copied on application at the Offices of the Company, 154, High Street, Eton, between the hours of Ten a.m. and Four p.m.
Tenders to be sent in not later than Four o'clock p.m. on Monday, the 18th of February, addressed to the Chairman of the Company, and endorsed "Tender for Gasholder."
The Directors of the Company reserve to themselves the right of refusing to accept the lowest or any tender.
By order,
GEORGE HENRY LONG, Chairman.
Eton, Jan. 23, 1889.

TO MANUFACTURERS OF GAS APPARATUS.

GASHOLDER AND TANK REQUIRED.

THE Milton Improvement Commis- sioners invite TENDERS for the Erection, at their Gas Works in Milton, of a SINGLE-LIFT GAS-HOLDER with CAST-IRON TANK, and an *alternative* Tender for the HOLDER and BRICK TANK; with all necessary Columns, Girders, Valves, Inlet and Oulet Pipes (10-inch) complete. Size of the Holder: Diameter, 45 feet; depth, 15 feet.
Tenders should be accompanied by detailed plans and specifications, for which no payment will be made.
The Manager of the Works will on application furnish any further particulars or information that may be required.
Sealed tenders, endorsed "Tender for Gasholder," and addressed to the Chairman of the Milton Improvement Commissioners, Milton-next-Sittingbourne, should be sent or delivered to me on or before Monday, the 11th of February, 1889.
The Commissioners do not bind themselves to accept the lowest or any tender.
By order,
WM. PARHAM, Clerk.
Milton-next-Sittingbourne,
Jan. 23, 1889.

FITTINGS FOR RETORT MOUTHPIECES.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for FITTINGS for 112 RETORT MOUTHPIECES.
Drawings may be seen, and forms of tender with bill of quantities obtained, on application to the Company's Engineer, Mr. Fletcher W. Stevenson.
Tenders, marked as above, must be forwarded to the undersigned not later than Monday, Feb. 4, 1889.
By order,
HANBURY THOMAS,
General Manager.
Commercial Street, Sheffield.
Jan. 21, 1889.

TO STATION METER AND GOVERNOR MAKERS.

THE Directors of the Clayton, Allerton, and Thornton Gas Company are prepared to receive TENDERS for a SQUARE STATION METER, in Cast-Iron Ornamental Case, capable of passing 40,000 cubic feet of Gas per hour. Also Two COMPENSATING GAS GOVERNORS, one 18-inch and one 15-inch, with all Bye-Pass Arrangements, Valves, &c.
Particulars to be obtained from the Company's Engineer.
All tenders to be sent in, addressed to the Chairman of the Company, and marked "Tender for Station Meter" or "Governors" as the case may be, on or before Monday, the 11th day of February, 1889.
By order,
JOHN NIVEN,
Engineer and Manager.
Gas Works, Clayton, near Bradford,
Jan. 18, 1889.

THE GASLIGHT AND COKE COMPANY.

NOTICE is herby given that a Half- YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at this Office on Friday, the 8th day of February next, at Twelve o'clock (noon) precisely, to transact the usual business, including the declaration of a Dividend for the Half Year ending the 31st day of December last, and to elect Directors and Auditors in the place of those who will at such Meeting go out of Office, in compliance with the Company's Acts or Schemes of Amalgamation.
Notice is hereby also given that at such Meeting the Directors will apply to the Proprietors for authority to dispose of such further portion of the Company's Property as is not now required for the purposes of their Undertaking.
By order,
JOHN ORWELL PHILLIPS,
Secretary and General Manager.
The Gaslight and Coke Company,
Chief Office: Horseferry Road,
Westminster, S.W., Jan. 23, 1889.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Bridge House Hotel, London Bridge, in the Borough of Southwark, on Wednesday, the 20th day of February next, at Two o'clock in the Afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 31st of December last, and to declare a Dividend, to elect two Directors and one Auditor in the place of those retiring by rotation, and for other purposes.
The Transfer Books will be closed from the 6th day of February next until after the Meeting.
By order,
FRANK BUSH, Secretary.
Offices: 709A, Old Kent Road, S.E.,
Jan. 28, 1889.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the Ordi- NARY GENERAL MEETING of the Proprietors of the above Company will be held at the Company's Offices, North Street, Wandsworth, on Thursday, the 21st of February next, at Five o'clock in the Evening precisely, for the purpose of a declaration of a Dividend, the election of Directors and Auditors, and the transaction of the General Business of the Company.
The Transfer Books will be closed from the 8th till the 21st of February, both days inclusive.
By order of the Board,
W. CROMARTY, Secretary.
98, North Street, Wandsworth, S.W.,
Jan. 30, 1889.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Invention may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
Patents procured for Foreign Countries.
Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

THE ONLY RELIABLE

DRY CENTRE-VALVE.

WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.
ALSO MADE FOR TWO OR THREE PURIFIERS.

No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.
Write for Prospectus.
ALSO DOUBLE-ACTION DOUBLE-FACED GAS & WATER VALVES.
F. WECK, 86, NEW STREET, BIRMINGHAM.

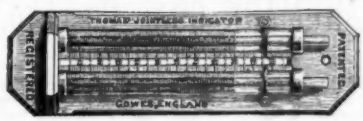
JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.
DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

GAS AND WATER PIPES.

¼ to 12 IN. BORE.

THOMAS ALLAN & SONS
SPRINGBANK IRON-WORKS,
GLASGOW;
AND BON LEA FOUNDRY,
SOUTH STOCKTON-ON-TEES.

Makers of SANITARY & RAIN PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES And GENERAL CASTINGS.



THE THOMAS JOINTLESS PRESSURE GAUGE.

They are proved to be the best ever made.

Supplied to the following Works:—

RYDE, VENTNOR, SHANKLIN, NEWPORT, EAST COWES, LYMINGTON, FAREHAM, WINCHESTER, BRIDPORT, GOSPORT, PORTSMOUTH, SOUTHAMPTON, READING, GUILDFORD, WARE, SOUTH METROPOLITAN, SALISBURY, AYLESBURY, NEWTOWN, WINSLOW, ABERGAVENNY, YARMOUTH, I.W., SANDOWN, I.W., WARE (repeat order), GUILDFORD, (repeat order), TROWBRIDGE, EASTBOURNE, HIGH WYCOMBE, WELLS, RAMSGATE, FELIXSTOWE, NEWTOWN (repeat order), CRYSTAL PALACE, UPPER SYDENHAM, BECKTON, BROADSTAIRS, NEWTOWN (repeat order for two), FAVERSHAM, SITTINGBOURNE, UXBRIDGE, PORTISHEAD, RICHMOND, CIRENCESTER, &c.

Gas-Works, Shanklin, I.W., May 7, 1888.

MR. A. THOMAS,
DEAR SIR,—I consider the new Pressure-Gauge a decided improvement upon the old style, especially for crude gas. I shall replace all broken gauges upon the works with your patent.
Yours faithfully, FRANK C. TAYLOR.

Cosham, May 15, 1888.

Mr. A. THOMAS, Cowes.
DEAR SIR,—I am perfectly satisfied with your new Pressure-Gauge; and for simplicity, it excels any other that has come under my observation. It is perfectly accurate in registering when compared with the ordinary gauge; being jointless, is cleaned with the greatest ease and least possible risk of breakage.
Yours truly, JOHN HENRY LYON.

Gas Offices, Guildford, Sept. 26, 1888.

Mr. THOMAS,
SIR,—I have pleasure in testifying as to the excellence of your jointless Pressure-Gauges. I certainly consider them a great improvement on the old form of gauge; and the ready and easy manner in which the gauges can be taken to pieces for cleaning, coupled with no risk at all of breaking, should secure their adoption whenever Gas Pressure-Guages are required. We sent another order from Guildford yesterday. I remain, truly yours, W. LONGWORTH.

Salisbury, Oct. 1, 1888.

Mr. A. THOMAS,
DEAR SIR,—I have used the set of double 18-inch Gauges on your principle at Salisbury for about three weeks, and consider them in every way an improvement on the U-pattern gauge. They are simpler, cheaper, more easy to clean and keep in order, more portable, and less liable to fracture.
Yours faithfully, N. H. HUMPHRYS.

Gas-Works, Fareham, Nov. 15, 1888.

Mr. A. THOMAS, Cowes.
DEAR SIR,—Your Gauges have exceeded my expectation. I have had them in use for several months; and I consider them a great improvement on the old gauge.
Yours faithfully, J. GRIFFIN.

For further particulars, apply to—

A. THOMAS, GAS-WORKS, COWES.

THOMAS ILLINGWORTH,

NORTH DEAN CHEMICAL WORKS,
Near HALIFAX,
MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

CAST-IRON PIPES

FOR GAS AND WATER.

VALVES

FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."

WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

THE
LANEMARK COAL Co., LTD.,

Now offer their superior

GAS COALS

LANEMARK CANNEL.

Yield of Gas per ton . . 10,880 cub. ft.
Illuminating Power . . 29·21 candles.
Coke per ton . . . . 1266·96 lbs.

LANEMARK GAS COAL.

Yield of Gas per ton . . 11,379 cub. ft.
Illuminating Power . . 17·88 candles.
Coke per ton . . . . 1285·53 lbs.

LANEMARK GAS BRIQUETTES.

Yield of Gas per ton . . 10,734 cub. ft.
Illuminating Power . . 22·70 candles.
Coke per ton . . . . . 1320 lbs.

For Prices and Analyses apply to
LANEMARK COAL Co., Ltd.,
NEW CUMNOCK, N.B.

TROTTER, HAINES, & CORBETT,

BRETTELLS' ESTATE
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK,
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAYS.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

GAS COAL.

POPE & PEARSON, LTD.,

have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke.

This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

THOMAS TURTON AND SONS, LIMITED,

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STEEL OF ALL DESCRIPTIONS.
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JAMES WHITE & CO.,
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FOR GAS FURNACES our GANNISTER and SILICA FIRE-BRICKS are acknowledged to be the best and most durable in the market.

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TYNE
BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles
Coke per ton . . . . . 1,301·83 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

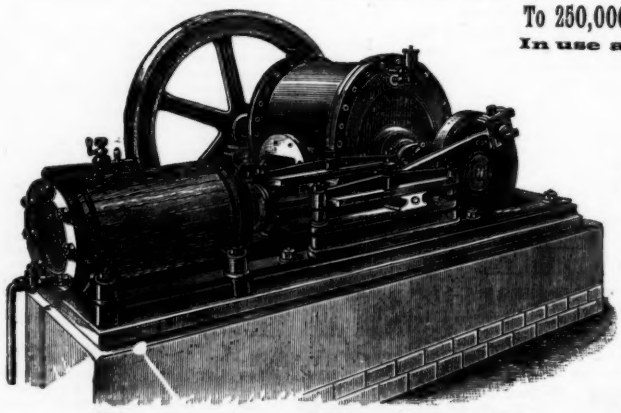
For Prices and complete Analysis, apply to
YOUNG, DANCE, & CO.,
COAL OWNERS, NEWCASTLE-ON-TYNE,
Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.

G. WALLER & CO.'S NEW PATENT GAS EXHAUSTER.

MADE with FOUR or THREE BLADES

To 250,000 Cubic Feet per Hour, with or without Engine combined.

In use and on order for over 100 Works, equal to 3,850,000 Cubic Feet per Hour.



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SPECIAL ADVANTAGES:

This Four-Blade Exhauster will pass fully 15 per cent. more per revolution than any other Four-Blade Exhauster with the same size cylinder, and with from 15 to 30 per cent. less friction or driving power, and without oscillation.

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No other Exhauster gives such a steady gauge.

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On Special Terms or Guaranteed Dividends.

Contractors for the Erection of New and Remodelling of existing Gas-Works from own or Engineers' Drawings.

25 Years' experience in Gas Manufacture and Distribution in London and the Provinces.

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WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
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Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

LUX'S GAS-BALANCE.

(For Description, see JOURNAL OF GAS LIGHTING, July 17, 1888.)

For the Automatic Determination of the Specific Gravity and the Composition of Gases.

Patented In Great Britain and Abroad.

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G. R. HISLOP'S PATENT REGENERATIVE PROCESS

MOST EFFECTIVELY AND *ECONOMICALLY RESTORES* LIME WASTES CONTINUOUSLY.

The Patentee having under his several Patents effected a complete solution of the Spent Lime difficulty, most confidently solicits the consideration of the fact by the Engineers and Managers of Gas Companies, Gas Corporations, and other SpentLime producers. The adoption of these Patents secures the following amongst other advantages, viz.:—1st. Nuisance is avoided, and the utmost convenience and comfort in Gas purification are secured. 2nd. The Lime is recovered at from one-third to one-half the cost of new Lime, or from 5s. 6d. to 7s. 6d. per Ton (depending on extent of works and working charges). 3rd. The Lime is either recovered for Building and Agricultural purposes, or specially and continuously for Gas purification—no limit being assigned to its durability. 4th. Nearly the whole of the valuable sulphur is collected and sold. 5th. By the Patentee's Improved Furnace, breeze or inferior cannel coke only is required as a fuel. The process has been worked for a considerable time by several important Gas Companies and Corporations throughout the Kingdom, and with the most satisfactory results. The Patentee erects, proves, and grants working on very moderate terms.

Further particulars may be had on application to A. F. WILSON, Esq., Assoc. M. Inst. C.E., 12, Walbrook, London, E.C., Agent for London; J. E. FISHER, Esq., Stourbridge, Agent for the rest of England, Wales, and Ireland; or to the Patentee—

GEO. R. HISLOP, Engineer, GAS-WORKS, PAISLEY, N.B.

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Makers of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

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GAS ENGINEERING WORKS,
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PLANS and SPECIFICATIONS furnished for **Extensions** and **Enlargement** of existing **Works,** adapting them to the most **Improved** and **Modern Principle** of **Gas Manufacture.**

PURIFIERS, CONDENSERS, WASHERS, ENGINES and EXHAUSTERS, STATION METERS and GOVERNORS, manufactured and erected.

Makers, by permission of that eminent authority **Mr. GEORGE LIVESEY,** of his **CELEBRATED PATENT WASHER,** highly approved by all the Engineers of Works where adopted. Largely in demand.

Special reference and attention are invited to our

WET AND DRY METERS,

which have acquired a high reputation for the **excellence** of Materials and Workmanship; their **durability** and **accuracy** of **Register** guaranteed. They are used by several of the **London Gas Companies,** and over **200 Provincial Gas Companies.**

Price Lists, Specifications, and Estimates provided for any work appertaining to Gas Lighting, from the Retort-House to the Drawing-Room.

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OF THE BEST QUALITIES.

Prices and Analyses on Application.

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PATENT GAS SERVICE CLEANSER.
The patent has now expired. No licence is therefore equired for using this. Cleansers (in tin case for powder and caps), as supplied to the principal Gas Undertakings, can be obtained at 3s. 6d. each from
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Prices and Analysis on application.
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TELESCOPIC EXTENSION LADDERS & STEPS. All sizes, many patterns, large stock for all purposes, indoor and outdoor. Admirable inventions.
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Five Samples submitted at same time to secure above Rate.
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And of WARNER'S PATENT MARKET GAS STAND-PIPE.
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JOHN BROWN & CO., LIMITED,
ATLAS STEEL AND IRON WORKS, SHEFFIELD,
ALDWARKE MAIN GAS COAL.
This Coal yields 12,600 feet of 19-candle gas per ton.
Weight of illuminating matter in pounds of sperm, 820·80. Very free from impurities.

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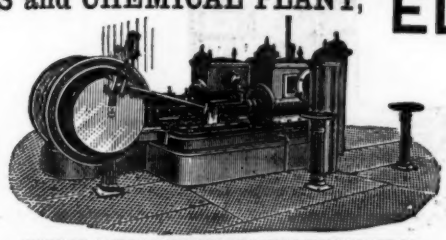
VALVES OF ALL DESCRIPTIONS AND FOR ALL PURPOSES.
LARGE STOCK KEPT.

DIRECT-ACTING RECIPROCATING EXHAUSTERS.

ALL VALVES TESTED TO 40lbs. AND FLANGES FACED.
Prompt delivery guaranteed.
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TELESCOPIC AND SINGLE-LIFT GASHOLDERS,
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IMPROVED FIXED OR TRAVELLING HYDRAULIC PURIFIER-COVER LIFTERS,
PURIFIERS, CONDENSERS, SCRUBBERS, EXHAUSTERS, AND PUMPING-ENGINES,
TAR AND LIQUOR PUMPS, HYDRAULIC SLUICE AND SLIDE VALVES, LAMP-POSTS AND HYDRANTS COMBINED.
DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.
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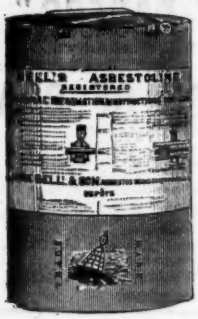
BELL'S ASBESTOLINE.

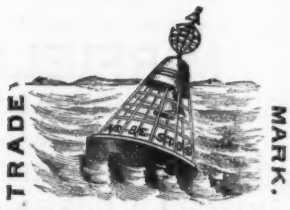
REGISTERED.



All kegs are labelled as above.

ADVANTAGES OF ASBESTOLINE.

ASBESTOLINE is the most efficient Lubricant for all bearings.
ASBESTOLINE is the cheapest Lubricant.
ASBESTOLINE saves from 50 to 90 per cent. of the Cost of Oil.
ASBESTOLINE is the Cheapest Lubricant.
ASBESTOLINE is favoured by Insurance Companies.
ASBESTOLINE is the most Inodorous Lubricant.
ASBESTOLINE is the safest Lubricant from Ignition.
ASBESTOLINE has beaten all other Lubricants in trials.
ASBESTOLINE is applicable in and out doors in every Climate.
ASBESTOLINE requires no special application.



CONSISTENCY OF ASBESTOLINE.

ASBESTOLINE, to meet all circumstances, is made in four degrees of consistency—A, B, C, and CC.

ASBESTOLINE, A, is specially adapted to ordinary Land Engines and Machinery, in and out door, in this country.

ASBESTOLINE, B, a little more solid, is for use on Steamships in temperate climates, also on land when it is desirable to have Lubricant stiffer than A.

ASBESTOLINE, C, is for use in tropical climates, both ashore and afloat. It is also invaluable in works in this country when the temperature is high.

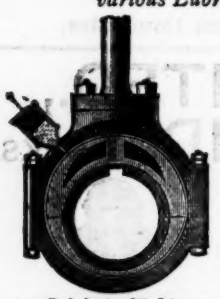
ASBESTOLINE, CC, is designed for use on Calenders, Paper-Machines, &c., where the bearings are heated by steam passing through, and sometimes is advantageously used instead of C.

The reputation of Asbestoline as a Lubricant of the highest efficiency in every kind of Machinery is established; and it has never been equalled by any other Lubricant in the numerous cases of special difficulty in which the best oils are ineffectual. It is used with marked success in Steel and Iron Works, Collieries, Cotton and Wool Mills, and other Textile Manufactories. In Corn-Mills it has proved invaluable on the roller and other modern machines. In Saw-Mills, on machines going up to 6000 revolutions per minute, its work has never been approached by any other Lubricant. On Electric Lighting Machinery, and in Steamships of all sizes throughout the world, the success of Asbestoline is unequalled. Many engines and machines of all descriptions give trouble, and show bad results both in working and wear, when the system of lubrication has not received due consideration. Engineering firms of the highest standing have given to it their powerful testimony and support.

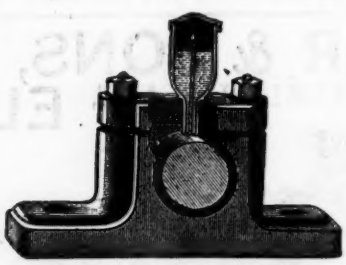
Supplied in Kegs, 28, 56, or 112 lb. Price, 2/3 per lb. Kegs Free. Special Terms for Large Quantities.

IMPORTANT TO EXPORT MERCHANTS.—*One pound of "Asbestoline" equals 2 gallons of Oil weighing 18lbs.; consequently the saving in freight is very considerable. Liberal Terms are conceded to Export Merchants.*

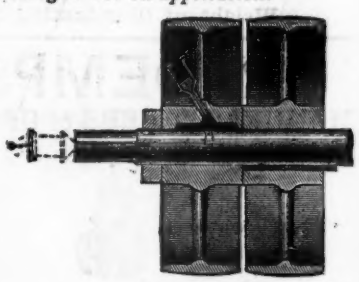
Below will be found illustrations of the mode of fixing Lubricators for Asbestoline to bearings. Full particulars of the various Lubricators supplied for Asbestoline, and the manner of fitting, in catalogue free on application.



Lubricator fitted to Eccentric of Vertical Engine



Showing Section of Lubricator fitted to ordinary Bearings.



Lubricator in different position for Loose Pulleys.

THE ATTENTION OF

ENGINEERS, AND ALL USERS OF STEAM POWER AND MACHINERY,

IS SPECIALLY INVITED TO THE FOLLOWING REPORT.

Owing to the number of Greases now offered, samples of BELL'S ASBESTOLINE were submitted to Otto Hehner, Esq., for analysis, and the subjoined Report fully proves BELL'S ASBESTOLINE to be the safest as well as the best Lubricant for all purposes:—

The Laboratory, 11, *Billiter Square, E.C., London, May* 8, 1888.

I have subjected a sample of Bell's Asbestoline taken from the stores of Messrs. J. Bell and Son, in Southwark Street, to a number of tests, in order to ascertain whether its use in Mills or Factories might contribute to the danger from Fire.

I found that Asbestoline **ignites only with the greatest difficulty** when brought into contact with flame; that wood and other combustible material soaked in Asbestoline burns, if anything, with greater difficulty than by itself; that its **flashing point is so high that it lies beyond the range of Mercurial Thermometers**; and that consequently no friction obtainable in the ordinary run of machinery is capable of developing inflammable vapours from it.

Bell's Asbestoline is **as absolutely safe a Lubricant as can be desired or obtainable.** In the case of fire breaking out from any cause, it does not assist the conflagration; and it is **quite incapable of leading to spontaneous combustion,** either by itself or in contact with inflammable material.

From the physical nature of Asbestoline its use is of necessity perfectly clean and free from waste.

(Signed) OTTO HEHNER, Public Analyst.

Illustrated Priced Catalogue, with numerous Testimonials by Leading Firms, free on application.

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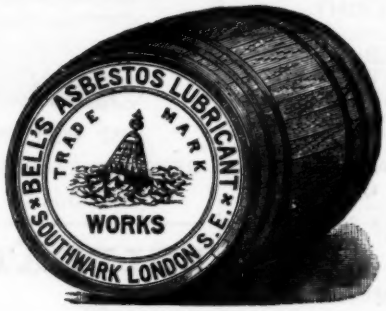
DEPOTS—MANCHESTER: Victoria Buildings, Deansgate. LIVERPOOL: 2, Strand Street, James Street.

BELL'S ASBESTOS LUBRICANT.

(REGISTERED.)

All Drums marked as above.



Every Cask is sent out as above.

All Corks are sealed as above.

Any Customer receiving Oil sold as **Bell's Asbestos Lubricant**, and Cask, Drum or Corks not marked as above, is earnestly requested to forward us sample and particulars of where obtained.

The following Oils, refined and prepared by our Asbestos process, are specially recommended to Users of Machinery of every kind in all parts of the world. We guarantee the quality of each to be unequalled at the price for the purpose named, and a Sample Drum, containing 5 gallons of each or any sort, will be sent on approval to any respectable firm in any part of the world :—

BELL'S SPECIAL GAS-ENGINE OIL.—This oil is guaranteed to stand flame temperature, and is suitable for light Machinery and Shafting where gas power is used.
Price **2s. 9d.** per gallon.

1a.—BELL'S SPECIALLY PURIFIED DARK CYLINDER AND VALVE OIL.—This oil is guaranteed not to gum, corrode, or in any way injure metal surfaces. It will not carbonize, nor leave any deposit whatever in cylinders or condensers, nor will it injure india-rubber valves. It is absolutely pure hydrocarbon, and will work admirably in all good Sight-feed Lubricators.
Price **3s. 9d.** per gallon.

2a.—Bell's Specially Refined and Purified Pale Cylinder and Valve Oil contains the same properties as 1a, and is one of the very best Oils of the Valvoline class in the market.
Price **4s. 6d.** per gallon.

BELL'S PALE COMPOUND MACHINERY AND ENGINE OIL FOR EXTERNAL LUBRICATION ONLY.

"3c."—For small and medium-sized Engines, Shafting, and quick-running Machinery, displacing Lard Oil. Price **2s. 6d.** per gallon.

"3c. Special."—Heavier bodied than "3c," and suitable for Locos. and Stationary Engines up to 300-H.P., displacing Olive Oil.
Price **2s. 9d.** per gallon.

"3c. Marine."—Much heavier than "3c.;" suitable for Marine Engines and heaviest Stationary Engines, Shafting, &c., displacing Castor Oil. Price **3s.** per gallon.

BELL'S AGRICULTURAL MACHINE OIL, for Traction Engines, Road Rollers, and all Machines working out of doors. This Oil will not set on bright parts, is not affected by extreme cold or the rays of the sun. Price **2s. 9d.** per gallon.

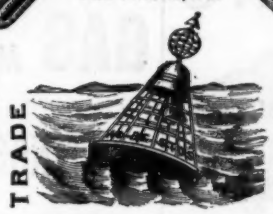
For other Qualities and Prices, with Testimonials, see Catalogue, free on application.

BELL'S ASBESTOS

EXPANSION SHEETING.

The above, which can only be obtained from this house, is recognized as the Most Efficient and Economical Jointing Material in use. It is composed of a specially prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above, and as it is the only Jointing Material which adequately combines PERMANENT ELASTICITY WITH HEAT RESISTANCE, the advantage it possesses will at once be seen.

SECTION OF SHEETING.
PATENT No. 640, 1884.



BELL'S ASBESTOS.

EXPANSION RINGS.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow expansion and contraction to be fully taken up. The covering, being of Asbestos Cloth, imparts a protection to the centre, and so prolongs its elasticity. For Manhole, Mudhole, Steam-Pipe, and Mash-Tun Door Joints it is unequalled; and if applied as directed, a ring can be used many times over.

Price **6s.** per lb. in Sheets. Rings made up to Template, **9s.** per lb.

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

Illustrated Priced Catalogues, with numerous Testimonials from Leading Firms, free on application.

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CARDIFF: West Bute St. BIRMINGHAM: 7, John Bright St. HULL: Humber Dock Basin. GLASGOW: 35, Robertson St.

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NEW HIGH-POWER GAS-LAMP, WESTPHAL'S PATENT.
MOST INTENSE WHITE BRILLIANT GAS LIGHT.
MOST ECONOMICAL, SIMPLE, AND DURABLE.
DOES NOT GET OUT OF ORDER.
RIVALS THE ELECTRIC LIGHT.
NO ALTERATION REQUIRED TO EXISTING FITTINGS.
BURNER, BEING A CIRCULAR SLIT, DOES NOT CHOKE UP.

PARTICULARS & PRICES POST FREE.

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SOLE CONSIGNEES FOR GT. BRITAIN & COLONIES,
153 TO 155, CANNON STREET,
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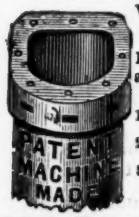

WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

F. & C. OSLER,

(ESTABLISHED 1807)

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES,
TABLE GLASS OF ALL KINDS,
CHANDELIERS IN BRONZE AND ORMOLU.
MODERATOR LAMPS.

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MANUFACTORY AND SHOW-ROOMS:
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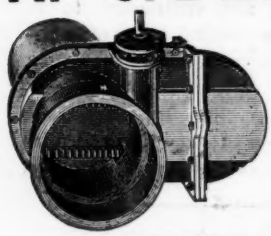

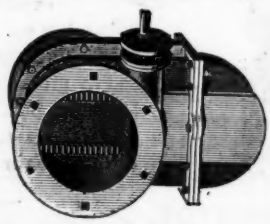

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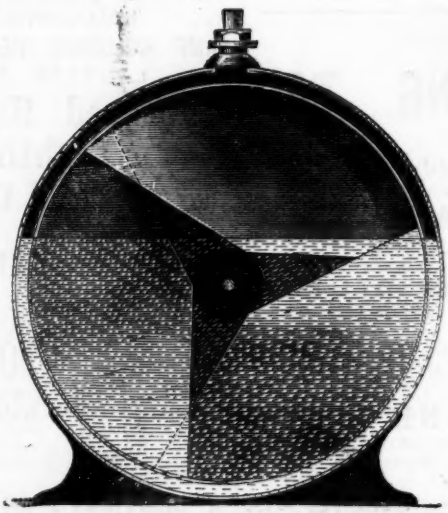

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